VOL. 1 No. 1
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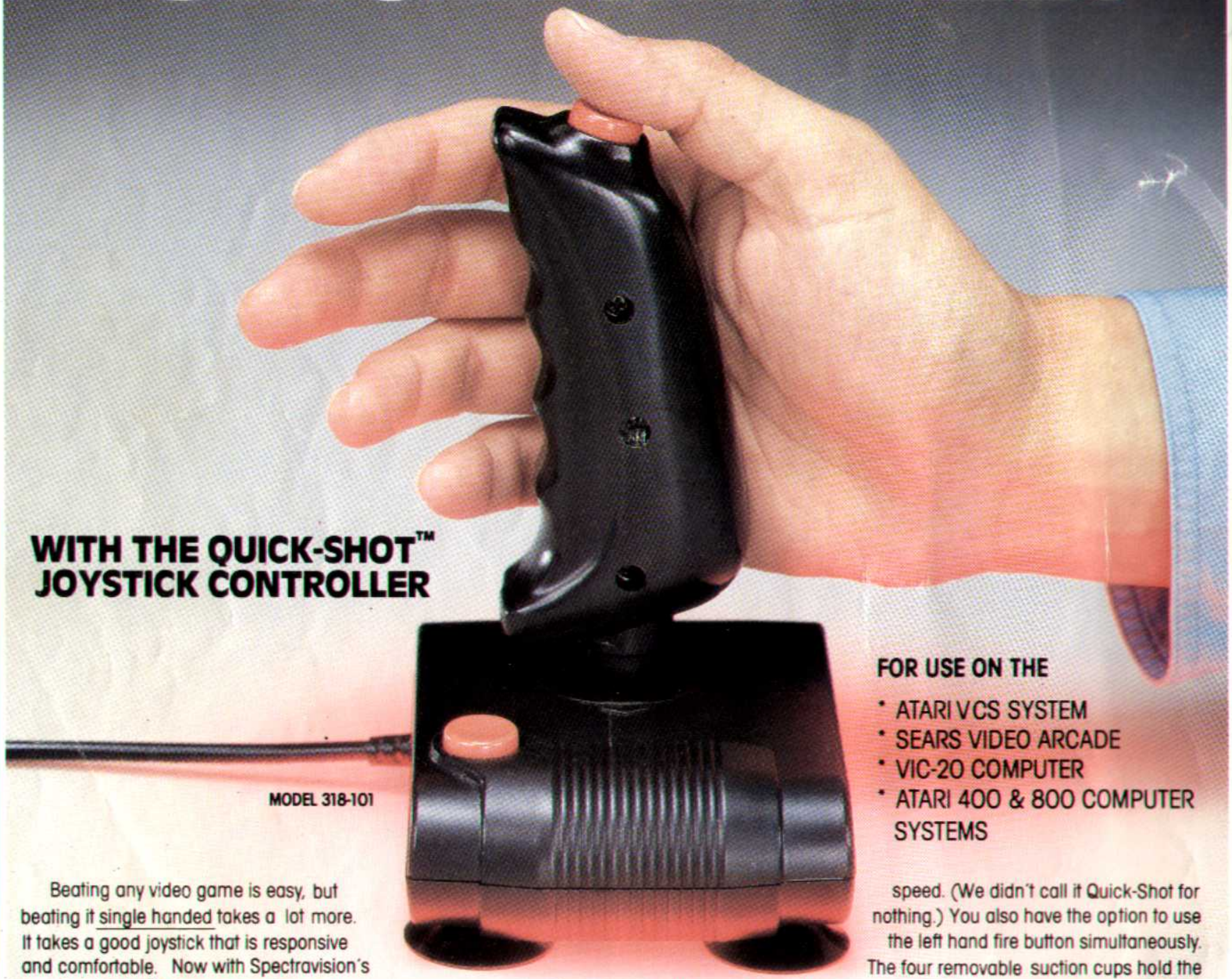

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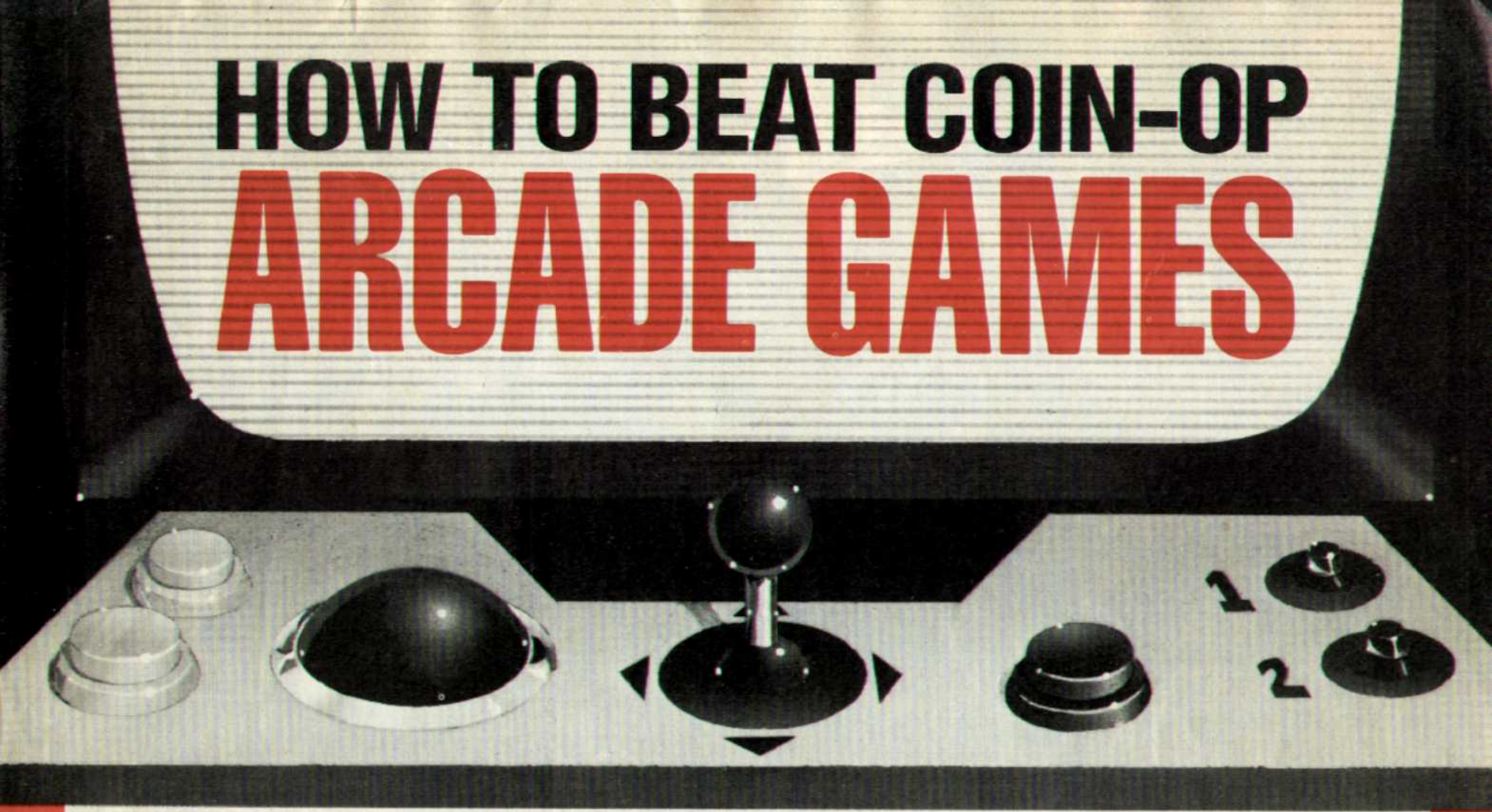

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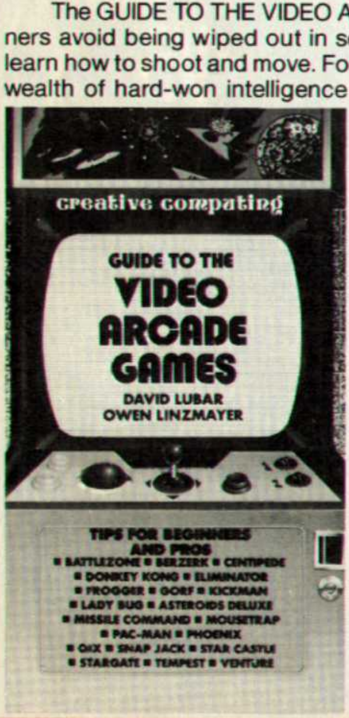
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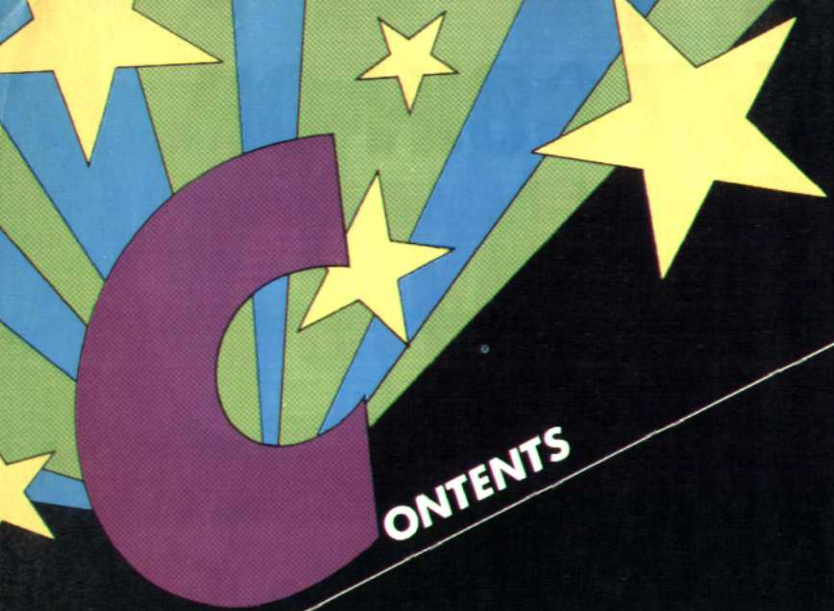

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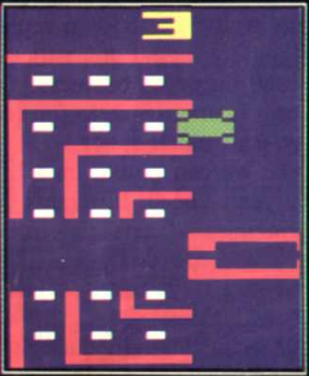

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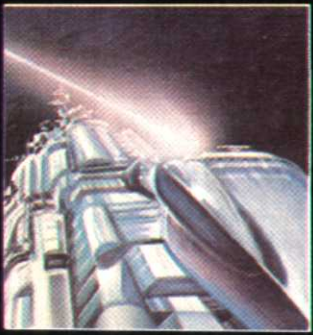

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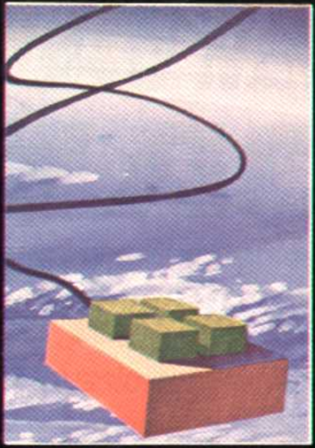

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CREATIVE COMPUTING
VIDEO & ARCADE games

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# EDITORIAL

1958. Twenty-five years ago. A landmark year for video and computer games.

"Are you kidding?" you say. "Ahl, you're off your rocker. Nolan Bushnell didn't invent Pong until 1973. Now *that* was a landmark year."

True enough, but bear with me. In 1953 a team of scientists at Bell Labs devised a brand new solid state electronics device, the transistor. Development of this revolutionary device proceeded apace until 1958 when—*voila!*—a deposited film transistor was made. Why *voila?*

Because now not only could a transistor be deposited on a hunk of silicon but, on the same piece of silicon, diodes, resistors, and even other transistors could be deposited as well. Thus was born the integrated circuit.

The integrated circuit (IC) is one fantastic device. Every year since its invention, the packing density of components on that same tiny piece of silicon has doubled. Today, a hunk of silicon about ¼″ square holds tens of thousands of transistors and other components.

In 1974 a small company by the name of Intel put an entire computer—a small one— on a single integrated circuit. Today, integrated circuits are the basis of virtually every computer (of any size), TV set, hi-fi system, video game, and electronic hand-held game as well as scores of other products. Affordable games would not exist were it not for the IC.

Another much less heralded event took place in 1958. Brookhaven National Laboratories, a major atomic energy research facility on Long Island, was a favored site for tours. Students with Science Congress projects, Boy Scouts, and all kinds of dignitaries visited the Labs. It was very impressive in an abstract sort of way.

William Higinbotham, a scientist at the Labs, decided to remove some of the abstraction. So he devised a tennis game using a computer and a circular CRT display. A blip—the ball—bounced over a net. The angle of the ball was set with a knob while pressing a button sent it back over the net. By today's standards, it wasn't much of a game. But hundreds of students saw it and went away with the idea that in addition to doing thousands of statistical calculations in a remarkably short time, computers could also be fun.

Soon, games began cropping up at university computer centers. An underground cult began playing tennis, Spacewar, and other games on large computers in the off-hours.

The word spread—computers can be fun. Professors at Dartmouth, the first large-scale (read, widely available) university timesharing system, were frustrated trying to rid the system of student games. So they responded by writing games with an educational content. Potshot, a game by Art Luehrmann, a physics professor, taught the principles of projectile motion, and boy was it fun!

More games followed at colleges and schools everywhere. In 1971, while education product line manager at Digital Equipment Corp., I put out a call for games to educational institutions throughout North America. I was overwhelmed with the response. I selected the best games and put them together in a book, *101 Basic Computer Games*. After putting the book together on my own time, I convinced reluctant managers at DEC to publish it. They were convinced it wouldn't sell. It, plus it's sequel, *More Basic Computer Games* have sold over half a million copies proving that people are intrigued by computer games. These two books, now published by Creative Computing Press, remain best sellers to this day.

In the preface to the third edition of *Basic Computer Games* (1978) I remarked that I believed that the surface of computer games had just been scratched. The personal computer (microcomputer) was then only two years old. I speculated that the most intriguing and interesting games would not be simulations of board games or sports or card games. Rather, they would be games that used the unique capabilities of the computer. I hammered away at this theme in presentations and radio and TV interviews. Most people listened politely, but were skeptical (after all, Chess is the ultimate game) or could not visualize what I had in mind ("what do you mean, 'using logic and timing to defeat animated patterns of alien creatures?' ").

Oh, that I could have shown them Galaxian, Pac-Man, Bezerk or Defender. But they weren't here a few years ago. At least not physically. However, they were in the back of someone's mind. And probably had been for 25 years and maybe much longer. We just had to wait for technology to catch up with man's incredible brain.

A few years ago, the host on a well-respected network radio show asked me where we will be—computer-wise, technology-wise, game-wise—in 100 years. "Good grief," said I, "one hundred years ago smart people were saying that airships would be used to replace oxcarts for hauling dung. Forecasting is a dangerous and uncertain business. One hundred years is impossible to forecast. Twenty-five isn't much easier."

But maybe we can go out on a limb looking ten years ahead. Programs will use the principles of artificial intelligence. They will converse with you in English and will seem nearly sentient. The action and challenge of a game will automatically adjust to individual player capability. Realistic action (movie quality) will be incorporated into games via video discs, computer animation or a combination of both. Multi-player games with opponents around the world will be commonplace. There will be games to appeal to a wide variety of tastes.

In the future, as in the past, games will be fun, challenging and mind expanding. ■

David H Ahl

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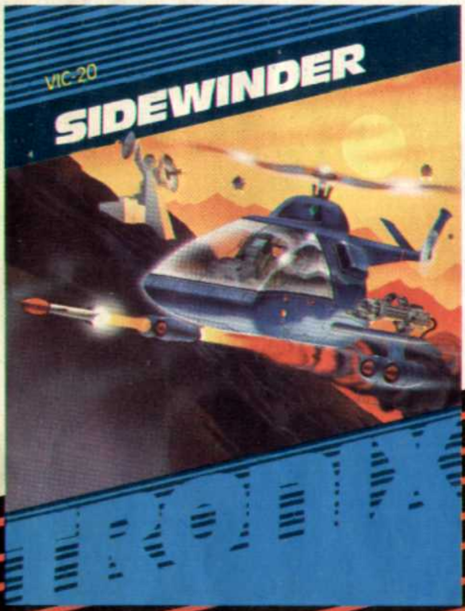

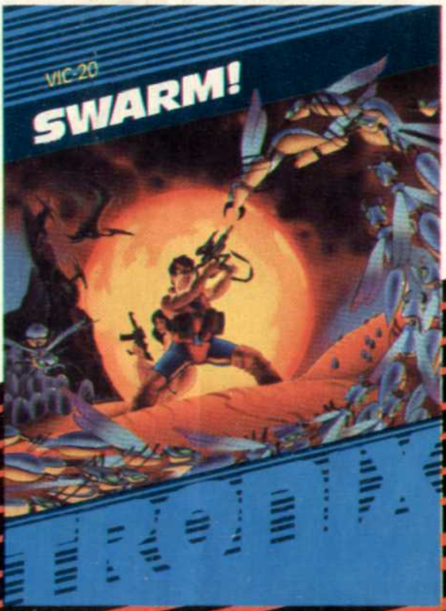

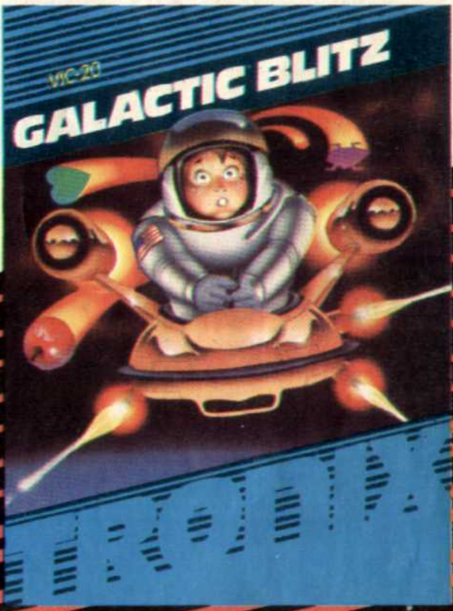

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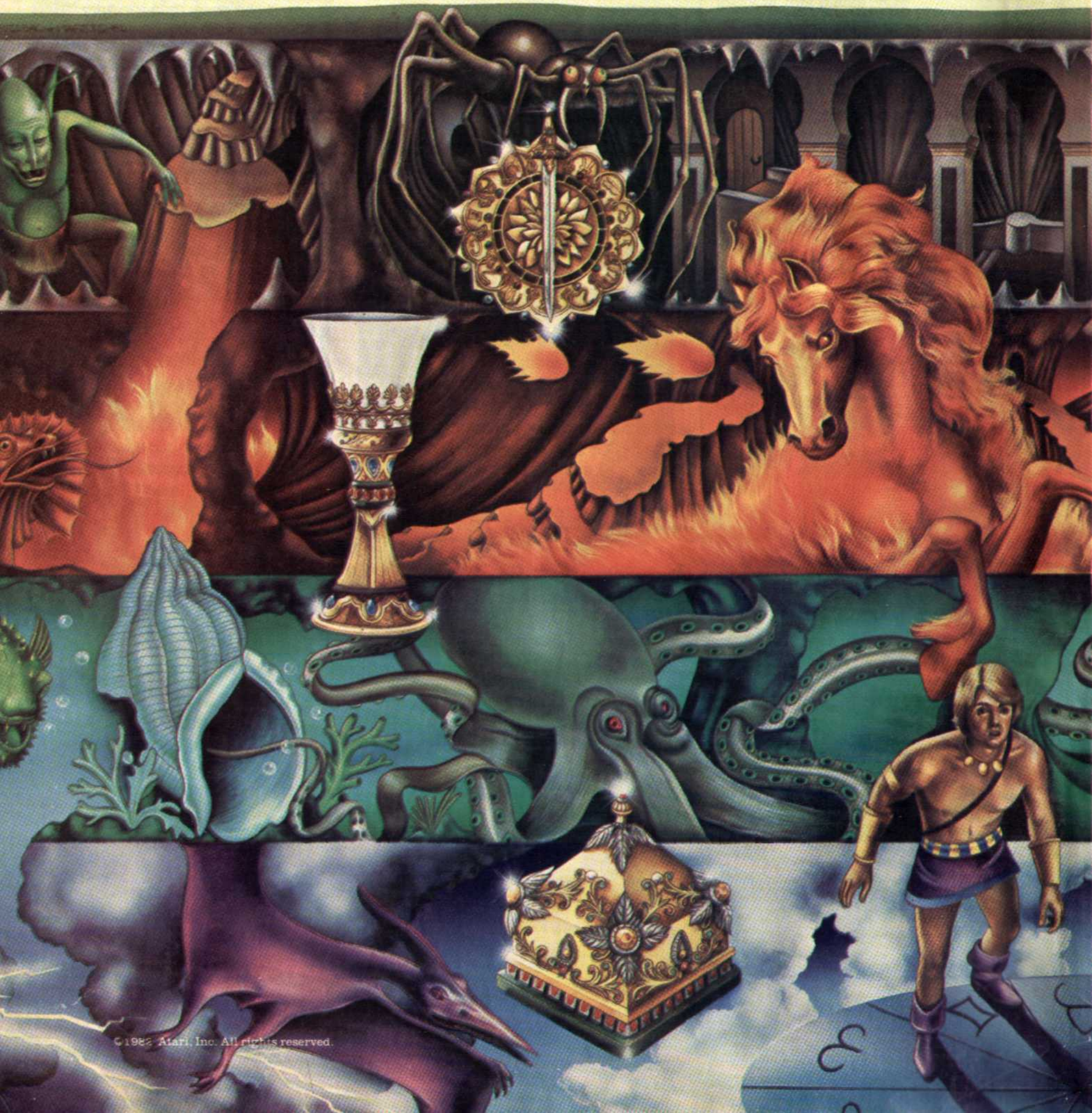

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# WHO REALLY INVENTED THE VIDEO GAME?

## There was Bell, there was Edison, there was Fermi. And then there was Higinbotham.

**By John Anderson**

The Space Age had just been birthed. Sputnik was a new and somewhat ominous presence in the evening sky—my father tells me he carried me to the roof of our apartment building to see it. I don't remember. The year was 1958, and I was two years old.

Dave Ahl, my boss, was a high school student. He had won a scholarship, one benefit of which was a tour of Brookhaven National Laboratory in Upton, NY. Something he saw on an oscilloscope there remained fixed in his mind for many years, and caused, among other things, a recent pilgrimage of my own.

Nearly 25 years after the fact, I found myself on the Long Island Expressway. I was trying to pass an eighteen-wheeler spewing gravel off its trailer, while I looked for the Brookhaven exit. It occurred to me that the Lab was hardly a stone's throw from Shoreham Nuclear Power Station, that controversial patch of multibillion-dollar poured concrete. I wondered if the proximity was mere coincidence.

Brookhaven is a government installation, and I get nervous at checkpoints. The guard at the gate had a familiar kind of hypertensive bearing. I wished then I had shaved that morning. I proffered my press card with clammy claw. He told me to pull my car off to the side; I knew the jig was up. I was a spy, an agent, a saboteur, and it was all over.

He handed me a piece of paper and said those chilling words: "Have a nice day." Upon inspection, the paper seemed to be a visitor's map. My adrenalin level began to subside.

It's really very simple to get to the Department of Nuclear Energy. You make a right near the linear accelerator, and pull into the lot next to the alternating gradient synchotron. If you see the tandem Van de Graff, you've gone too far.

From there, only one flight of stairs separates you from one of the great, unsung heroes of our time, Willy Higinbotham.

There was Bell, there was Edison, there was Fermi. And then there was Higinbotham.

Willy was responsible for the display Dave saw on that fateful day in 1958. Willy, you see, invented the video game.

We've received several manuscripts which attempt to set the record straight on the history of the video game. If you claim and can document a video game predating 1958, let us know.

Otherwise, give Willy Higinbotham his profound and historic due. Much to the chagrin of large corporations involved in current litigation, he did it first, and he has proved it.

Though he stands about five feet four inches tall, Mr. Higinbotham commands quite a stature. He very nearly chainsmokes unfiltered cigarettes, which he wolfs down with great voracity for a man of 72 years. His eyeglasses magnify to the point where his corneas seem as large as quarters. He laughs easily and likes to play the accordion, though he admits it's been a while since he's played at a party.

And, as a physicist in the Manhattan Project, he witnessed the detonation of the first atomic bomb.

Before we sat down to speak in earnest, Willy called an old friend, Dave Potter, and asked him to join us. Dave had worked with Willy on the original game designs. We adjourned to a conference room. As Willy got started, other scientists would wander into the room, find a perch, and listen along. "Isn't he something?" one of the scientists whispered. He sure is.

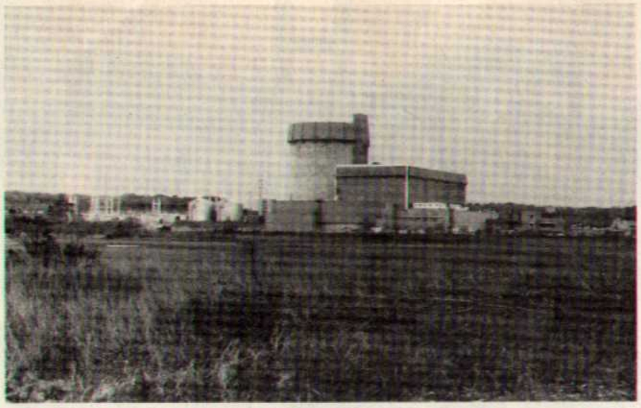
Back in the 1950's, when tours of the Laboratory were first instituted, they were rather static affairs, usually consisting of a group of photographs to depict some facet of research at the facility. Willy, who discovered his

penchant for physics at Cornell and electronics at MIT, explained that he wanted to make his display more dynamic. Give it a little punch. Wouldn't it fill the bill, he thought, if we got some sort of little game going on a CRT, so visitors could have some "hands-on" interaction with the hardware? He and his associates fashioned a tennis game played on the five-inch screen of an oscilloscope.

Digital computers were coming into their own in 1958; in fact, Willy's own Instrumentation Division was building one at the time. However his game contraption made use of an analog computer, one that used variable voltages rather than on-off pulses to represent information. To this was hardwired a nonprogrammable assemblage of electro-mechanical relays, potentiometers, resistors, capacitors, and "op-amps," short for operational amplifiers.

Willy himself is the first to admit that the arrangement was rather inelegant. But he also points out that it worked. He did make use of some recently invented transistors as flip-flop switches—a harbinger of things to come. Willy simply did the job in the shortest time with whatever parts were handy. The result was a video game, something no computer, digital or analog, had been harnessed to do before.

The screen display was a side view of a tennis court. It looked like an upside-down "T," with a shortened stem. This was the "net." Each player held a prototypical paddle, a small box with a knob and button on it. The knob controlled the angle of the player's return, and the button chose the moment of the hit. A player could hit the ball at any time, providing it was on his side of the net. Gravity, windspeed, and bounce were all portrayed. For example, if you hit a ball into the net, it would bounce lower than a bounce off the "ground," and would eventually die.


A few miles up the road, Shoreham Nuclear Power Station.

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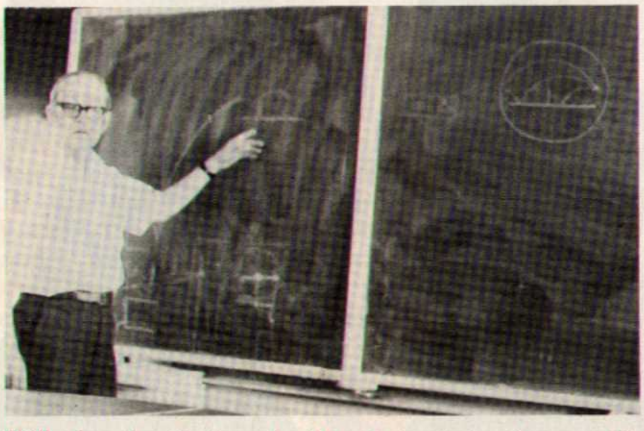
This must be the place.

Dave Potter (left) and Willy worked on the original design.


Willy describes the innards of his electronic tennis game. His rendering of the screen appears at right.

The game was simple, but fun to play, and its charm was infectious. Potter remembers the popularity of the game: "The high schoolers liked it best. You couldn't pull them away from it." He's probably remembering young Dave Ahl, staring at the screen with a little voice inside him saying "this could be something important."

The ball and court lines were drawn and redrawn sequentially, at a rate that made for a flicker-free view of ground, net, and ball. This is an approach still used in game playfield display. However the method of ball manipulation was and remains unique.

Without becoming too bogged down in explanation, consider the following. An oscilloscope is capable of generating cartesian coordinate displays. That is to say, a dynamic "graph" can be drawn, plotting the deflection of x or y proportionally to the voltages input as x or y.

Higinbotham rigged up a circuit wherein the plot of these functions simulated the trajectory of a bouncing ball. Op-amps from a Donner Labs analog computer were used to generate this trajectory and to sense when the ball had struck the ground. When this occurred, a relay would be thrown, reversing the polarity of another op-amp, so that the ball would reflect its path and "take a bounce." Primitive, but effective.

Other op-amps and relays were used to determine whether or not the ball had hit the net. As mentioned earlier, rebound velocity from the net was lower than from the ground, providing an extra bit of realism.

Velocity, slowed continually by wind-speed, was simulated straightforwardly with a 10 meg. resistor.

A toggle switch allowed players to choose which side to serve from, and net height, as well as court length, were adjustable. There was no way a player could "miss" the ball, as a push of the paddle button would always result in a hit when the ball was on that player's side of the net. Unless the player chose the correct angle and timing for a return, however, the shot would not make it back to the opponent's side.

The implementation was very much more sophisticated than the first "Pong" games. It was the hit of the Brookhaven "visitors' days" for two years running. Eventually, however, it was dismantled.

I asked Willy why he hadn't patented the thing at the time. He is responsible for over 20 patents, each of which reverted to the U.S. Government.

"We knew it was fun, and saw some potential in it at the time, but it wasn't something the government was interested in. It's a good thing, too. Today all video game designers would have to license their games from the federal government!" The idea somehow pleased Willy, and his laughter signalled it.

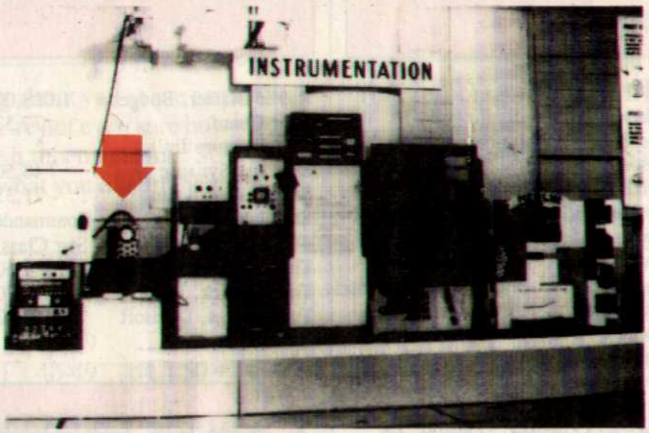
To Magnavox, however, the rights to video games are no laughing matter; they could mean millions. The corporation seeks a patent on video games using bouncing balls, and has taken sworn depositions from Higinbotham concerning his own invention. Though Willy stands to make no monetary gain whatsoever, he has a personal stake in the contest.

One must take a broader view of Willy's career to see the game from the perspective that he himself does.

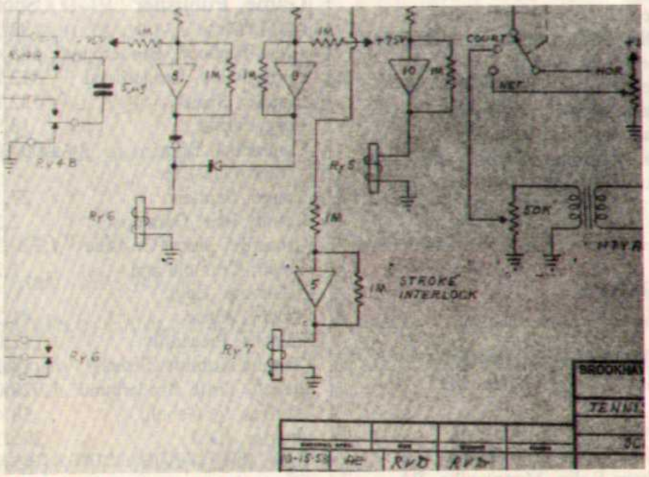
Higinbotham was a graduate student in Physics at Cornell University at the outbreak of World War II. He was invited to join research at the MIT Radiation Laboratory, where he worked on an advanced and important technique known as radio detecting and ranging, later shortened to RADAR.

From there he joined the Manhattan District Project, working as a physicist on another exotic and potentially important technology. He became head of the Electronics Division there in 1945. Higinbotham devised the timing circuits that took the first atomic bomb through the last few milliseconds preceding detonation.

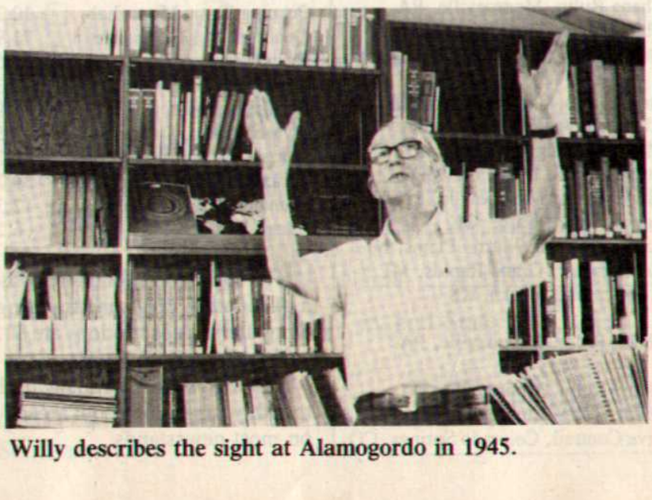
**The game was simple, but fun to play, and its charm was infectious.**



The oscilloscope on which the game appeared.



Note the date of the blueprint: Oct. 1958. This date has been verified.



Willy describes the sight at Alamogordo in 1945.

He worked with and knew J. Robert Oppenheimer quite well. "He was a charismatic man," says Willy. "People tended either to worship or detest him. I did neither. He was brilliant, though. There's no doubt of that."

At the time of the blast at Los Alamos, Willy was 24 miles from ground zero, able to watch the entire detonation through welder's glass so thick, he couldn't see an illuminated headlight through it.

I asked him what it had been like. He grew quiet. He said that he and the other observers got into the trucks and made the long trip back to the compound in utter silence. No one had anything to say.

Willy spent the next two years as executive secretary of the Federation of American Scientists, in Washington, D.C. He acted as a liaison between Congress and scientists, lobbying for the nonproliferation of nuclear weapons.

"It's taken over thirty years," Willy observes, "but the message is finally beginning to get through." His face brightens. Today, as a senior scientist at Brookhaven Laboratory, he and his colleagues have amassed the largest and most comprehensive library in the world concerning nuclear safeguards.

I was warming up the car for the long trip home, staring across a field at the building housing the cyclotron. He's not only something, I thought to myself. He's a walking bit of history. He also invented the video game! ■

# SURVEY OF HIGH SCORES

## Coin-op Arcade Games

| Game, Manufacturer | Score | Player, Location |
|---|---|---|
| Alpine Ski, Taito | 389,000 | Warren Conner, Bunlington, IA |
| Amidar, Stern | 18,210,100 | Joe Barrette, Kenosha, WI |
| Bosconian, Midway | 442,400 | Peter Zenke |
| Centipede, Atari | 12,311,126 | Mike Baird, Lakewood, CA |
| Defender, Williams | 52,151,450 | Jeff Manfrol, Concord, CA |
| Dig Dug, Atari | 6,198,490 | Antonio Median, Napa, CA |
| Donkey Kong, Nintendo | 3,151,800 | Steve Sander, Kansas City, MO |
| Donkey Kong Jr., Nin. | 220,900 | Tony Henson, Ames, IA |
| Frenzy, Stern | 145,427 | Tracy Parish |
| Galaga, Midway | 9,093,570 | Richard Rook, Santee, CA |
| Kangaroo, Atari | 267,600 | Phillipe Blanchard, Miami, FL |
| LadyBug, Universal | 186,200 | Mary Mendl, Morris Plains, NJ |
| Mousetrap, Exidy | 35,067,410 | Briggs Miller |
| Ms. Pac-Man, Midway | 256,410 | Michael Lepkosky, Houston, TX |
| Omega Race, Midway | 2,056,100 | Jim Banbury, Charlotte, NC |
| Pac-Man, Midway | 6,248,810 | James Anderson, Houston, TX |
| Robotron, Williams | 169,595,225 | Leo Daniels, Wrightsville, NC |
| Snap Jack, Universal | 112,790 | John Anderson, Morristown, NJ |
| Stargate, Williams | 40,001,150 | Ben Gold, Dallas, TX |
| Tempest, Atari | 3,086,355 | Leo Daniels, Wrightsville, NC |
| Tron, Midway | 3,195,329 | Sterling Ouchi, Lakewood, CA |
| Turbo, Sega | 90,667 | Paul Huggins, Chatsworth, GA |
| Tutankham, Stern | 168,000 | Paul Barrette, Kenosha, WI |
| Zaxxon, Sega | 1,793,500 | Robert Wykoff, Downey, GA |

## Atari Computer Games

| Game, Publisher | Score | Player, Home Town |
|---|---|---|
| Asteroids (flipover), Atari | 1,274,180 | Ken Williams, Niles, OH |
| Avalanche, Atari | 1,812 | Brian Hall, Milford, MI |
| Bug Attack, Cavalier | 42,926 | Chris Conway, Winnetka, CA |
| Canyon Climber, Datasoft | 216,000 | Shane Rolin, Monroeville, PA |
| Caverns of Mars, Atari | 206,900 | John Conrad, Chicago, IL |
| Centipede, Atari | 78,023 | Bob Lambeck, Southfield, MI |
| Chicken, Synapse | 630,400 | Shane Rolin, Monroeville, PA |
| Choplifter, Broderbund | 61 | Phil Heavin, Southfield, MI |
| Clowns and Balloons, Datasoft | 58,500 | Joey Grisaffi, Houston, TX |
| Crossfire, Sierra On-Line | 944,450 | Bryan Lum, San Francisco, CA |
| Cyclod, Sierra On-Line | 40,297 | Chris Conway, Winnetka, CA |
| Galactic Chase | 34,600 | Mustapa Slaughter, Daytona, FL |
| Ghost Hunter, Arcade Plus | 78,860 | Steve Tetrick, Wheaton, MD |
| Jawbreaker, Sierra On-Line | 176,310 | Shane Rolin, Monroeville, PA |
| K-razy Shootout, K-Byte | 83,200 | Packer Gunn, Tulsa, OK |
| Kayos, Computer Magic | 24,200 | John Anderson, Morris Plains, NJ |
| Missile Command, Atari | 941,200 | Ron Kramer, Grand Rapids, MI |
| Mouskattack, Sierra On-Line | 245,600 | I. Ketchum, Topeka, KS |
| Pacific Coast Hwy, Datasoft | 100,900 | Shane Rolin, Monroeville, PA |
| Pac-Man, Atari | 934,793 | Shane Rolin, Monroeville, PA |
| Preppie, Adventure Int'l | 59,310 | Shane Rolin, Monroeville, PA |
| Protector, Synapse | 56,000 | Liva Contrail, Colorado Springs, CO |
| Raster Blaster, Budgeco | 1,028,000 | Robert Hahn, Dayton, OH |
| Rear Guard, Adventure Int'l | 77,530 | Joey Grisaffi, Houston, TX |
| Shamus, Synapse | 48,500 | Dash Dammett, San Francisco, CA |
| Snake Byte, Sirius | 21,330 | Chris Conway, Winnetka, CA |
| Star Raiders, Atari | Commander Star Class 1 | John Anderson, Morris Plains, NJ |
| Threshold, Sierra On-Line | 309,500 | Ron Felder, Sunnyvale, CA |
| Track Attack, Broderbund | 10,706 | Chris Conway, Winnetka, CA |
| Tumblebugs, Datasoft | 7,023 | David Rogers, Chagrin Falls, OH |

## Apple Computer Games

| Game, Publisher | Score | Player, Home Town |
|---|---|---|
| ABM, Muse | 92,500 | Peter Silvo, Saratoga, CA |
| Alien Typhoon, Broderbund | 685,680 | Denise Archram, Canton, MI |
| Apple Panic, Broderbund | 512,860 | David Dantonio, Citrus Heights, CA |
| Bandits, Sirius | 122,821 | Wilbur Cross, Taconic, NY |
| Borg, Sirius | 18,960 | Matt Sesow, Lincoln, NE |
| Cannonball Blitz, Sierra On-Line | 1,000,000 | Ron Bunch, Collegedale, TN |
| Congo, Sentient | 27,154 | Mark McKeown, San Jose, CA |
| County Fair, Datamost | 2,369 | Derin Basden, Fresno, CA |
| Crossfire, Sierra On-Line | 1,120,310 | Brian Condon, Marietta, GA |
| Crush, Crumble and Chomp, Epyx | 1,290 | Ledru Corlett, Runaway Bay, TX |
| Escape, Muse | 41,200 | Dick Nitto, Binghamton, NY |
| Falcons, Piccadilly | 212,000 | Jeff Feldman, Miami Beach, FL |
| Gamma Goblins, Sirius | 18,160 | Bob Farr, Trenton, NJ |
| Genetic Drift, Broderbund | 1,020,000 | Tom Bredenoff, Columbus, OH |
| Horizon V, Gebelli | 58,405 | Jim Stockla, Shelton, CT |
| Juggler, IDSI | 206,380 | Matt Cox, New City, NY |
| Lazer Silk, Gebelli | 45,700 | Rob Berkowitz, Goldens Bridge, CA |
| Marauder, Sierra On-Line | 173,900 | Christian Juhring, Carmel, CA |
| Nightmare Gallery, Synergistic | 141,050 | Buell Hollister III, Shelburne, VT |
| Peeping Tom, Micro Lab | 12,360 | Jason Meggs, Bethesda, MD |
| Quadrant 6112, Sensible | 71,990 | Chuck Hartley, Natick, MA |
| Raster Blaster, Budge Co. | 7,025,500 | Eric Morson, Stamford, CT |
| Snack Attack, Datamost | 18,324 | James Baker, Alexandria, VA |
| Sneakers, Sirius | 1,035,982 | Marc Brodsky, Woodbridge, CT |
| Swashbuckler, Datamost | 1,501 | Brian Welch, St. Louis, MO |
| Threshold, Sierra On-Line | 688,200 | William Fitzhugh, Manchaca, TX |
| Torax, Creative Computing | 34,780 | Dale Archibald, Minneapolis, MN |
| Tsunami, Creative Computing | 12,336 | Kerry Shetline, Morristown, NJ |
| Twerps, Sirius | 6,250 | Dick Nitto, Binghamton, NY |

The high scores for many of the computer games came from *Softline*, a bi-monthly magazine focusing on entertainment software for home computers. Subscriptions are $12 from Softline, Box 60, North Hollywood, CA 91603.

The high scores for many of the arcade games came from *JoyStik*, a monthly magazine about arcade and home video games. You'll find it on most newsstands. ■

# FEEDBACK AND SCORES

We'd like to know something about you so we can make this a better magazine. We're not even sure how often you'd like to see us publish this magazine. So we're running this poll so you can tell us what you like in the gaming world and in this magazine.

Your response will be kept absolutely confidential except, of course, your name and score will be published if you have the high score on one or more games.

Please return this page or a photocopy to: *Video & Arcade Games,* 39 E. Hanover Avenue, Morris Plains, NJ 07960.

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**Sex:** ☐ Male ☐ Female

**Age:** ☐ Under 14 ☐ 15-17 ☐ 18-19 ☐ 20-21
☐ 22-29 ☐ 30-39 ☐ 40-49 ☐ 50+

**Household Income:**

☐ Under $10,000
☐ $10,000-14,999
☐ $15,000-19,999
☐ $20,000-29,999
☐ $30,000-39,999
☐ $40,000-49,999
☐ $50,000-74,999
☐ $75,000+

**How many hours do you spend per week playing:**

____ Arcade (coin-op) Games
____ Video Games (Atari, Intellivision, etc.)
____ Computer Games (Apple, Atari, VIC, etc.)
____ Electronic Games (Mattel, Coleco, Entex, etc.)
____ Board Games (Chess, Monopoly, Pay Day, etc.)

**What other magazines do you read on games or computers?**

| Magazine | Read Regularly | Read Occasionally |
|---|---|---|
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |
| ____________ | ☐ | ☐ |

**How often would you like to see *Video & Arcade Games* Magazine?**

☐ Monthly
☐ Bi-monthly
☐ Quarterly
☐ Semi-annually

**Favorite arcade (coin-op) games and your high scores:**

| | Game | High Score |
|---|---|---|
| 1. | ____________ | ______ |
| 2. | ____________ | ______ |
| 3. | ____________ | ______ |

**Favorite computer games and your high scores:**

Which computer ____________

| | Game | High Score |
|---|---|---|
| 1. | ____________ | ______ |
| 2. | ____________ | ______ |
| 3. | ____________ | ______ |

**Favorite video games and your high scores:**

Which video game ____________

| | Game | High Score |
|---|---|---|
| 1. | ____________ | ______ |
| 2. | ____________ | ______ |
| 3. | ____________ | ______ |

**Suggestions for Video & Arcade Games magazine:**

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Name: ____________

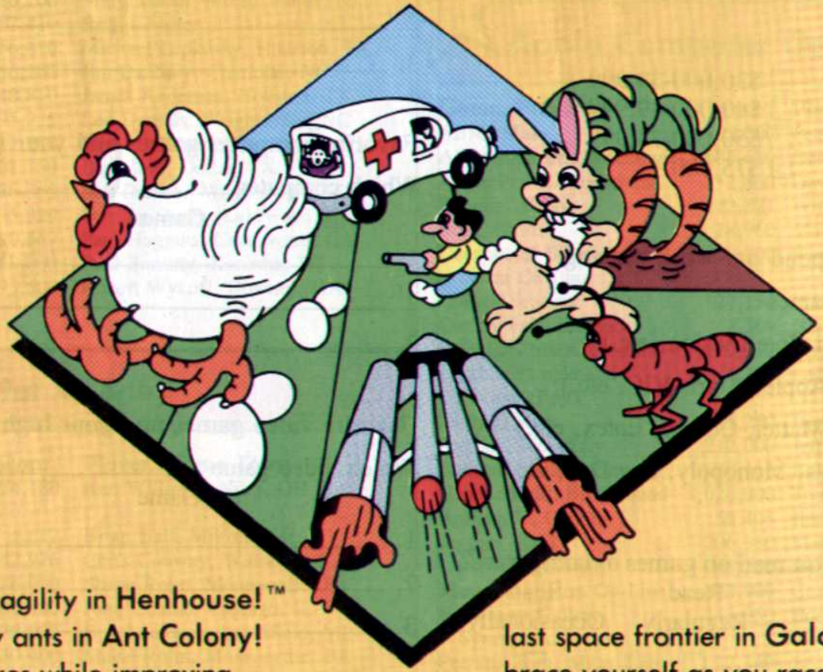
City and State: ____________

**Signature of another person verifying your high scores:**

____________

## *Coming Soon!*

# FUN & GAMES FOR THE TI-99/4A HOME COMPUTER.



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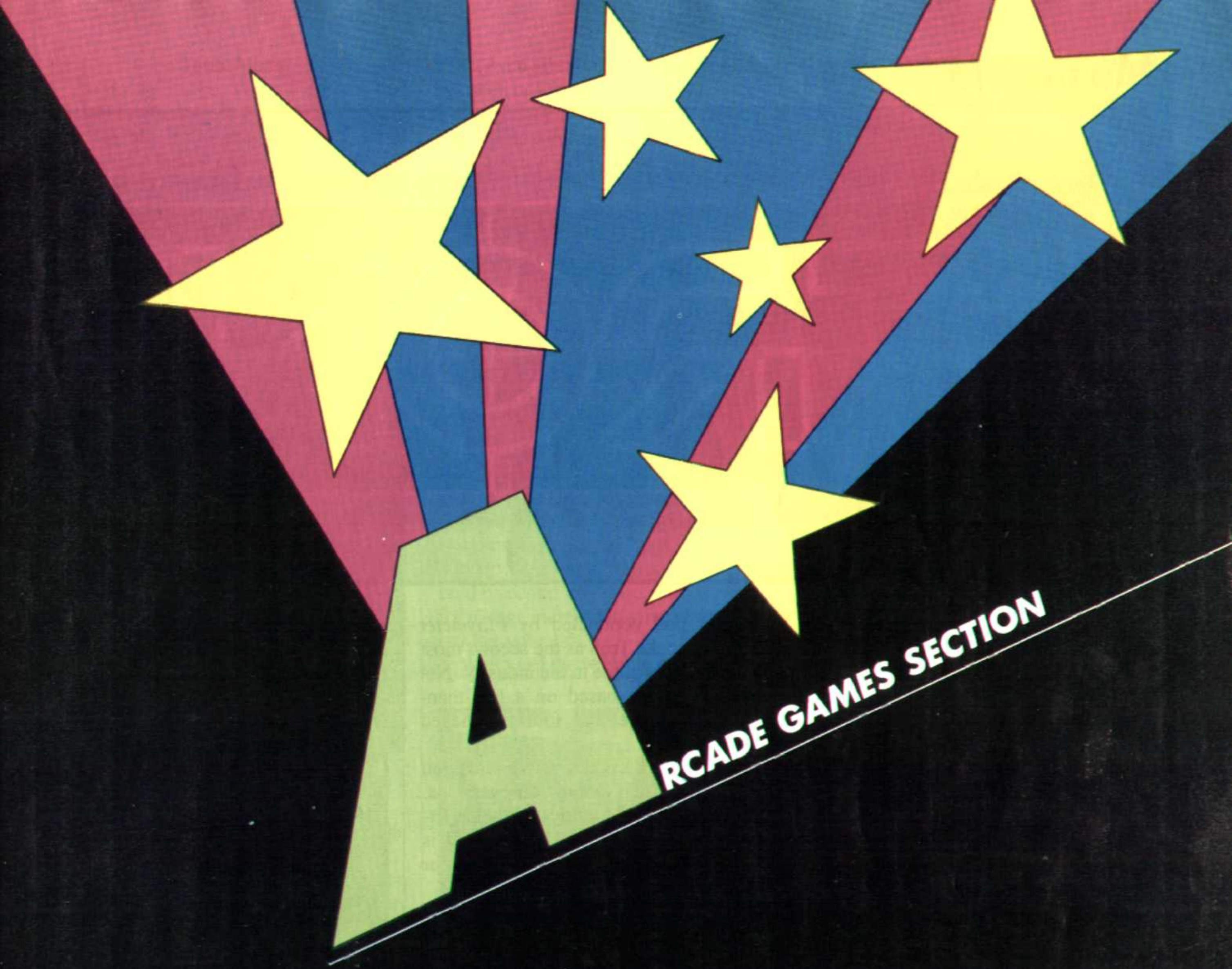
CIRCLE 12 ON READER SERVICE CARD



# ARCADE GAMES SECTION

# Mastering TRON

By Owen Linzmayer

In the movie version of Tron, the main character, Flynn, is sucked into an arcade game programmed to eliminate him. You see, Flynn is a computer genius and game lord on the side (or is it the other way around?). He believes that the company he worked for is now marketing his video games without his permission. While doing some clandestine reprogramming of the corporation's computer, he is dematerialized and thrown into the circuitry of the computer itself.

Inside the computer, he becomes his own program. He is sentenced to die fighting on the video game grid. Luckily, our hero is aided by Tron, a program that fights for the Users. Tron and Flynn team up against the Master Control Program (MCP) and attempt to break out of their parallel computer world. It's a classic battle of Good rebelling against an oppressive establishment.

The game of Tron is composed of four separate games based on certain memorable sequences from the movie: the MCP cone, Tank Maze, I/O Tower, and Light Cycles. The MCP sequence is a warped variation of the classic Breakout. The Tank Maze is a tank battle program with flashier packaging. Doing battle with the grid bugs of the the I/O Tower is a free style shoot-'em-up, and the Light Cycle game is a fast-paced version of the old game Surround.

It has been reported that the movie Tron did not do as well as expected in the theaters last summer. On the other hand, a recent poll conducted by *Playmeter* magazine ranks Tron as the second most popular arcade game in the industry. Not bad for a game based on a less-than-successful movie and four hackneyed game concepts.

In all but the Light Cycle board, you use the rotary dial to aim your weapons. The luminescent blue joystick has a firing button built into the handle and is used to control the movement of your character, the User.

Tron is not difficult to master once you understand some of the basic concepts behind the game play. The Light Cycles and Tank Maze present the biggest problem for most players, so don't feel bad if you find yourself losing men on these boards.

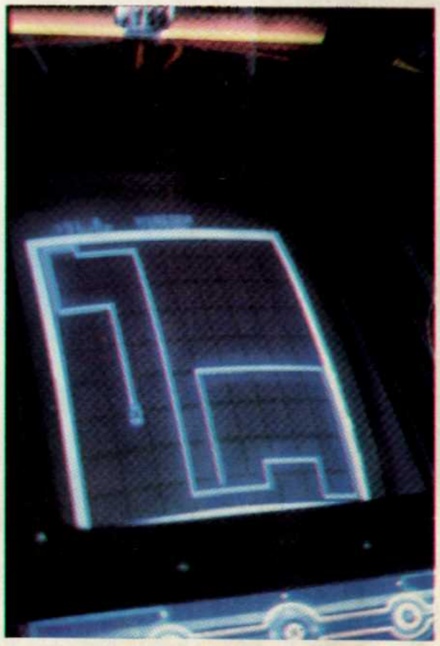
## Light Cycles

The trick to beating the yellow light cycles is to find patterns that trap them inside your blue trail. Rather than waste quarters devising your own patterns, watch what works for other players on the machine. A pattern that works once on a certain level will always work on that level.

**You will never encounter more than three enemy light cycles on the same board.**

The object of this game is to carve away a large portion of the board for yourself and slowly eat it up. The enemy doesn't monitor its consumption of the maze as carefully as it should, thus it is doomed to exhaust its share of space fairly quickly.

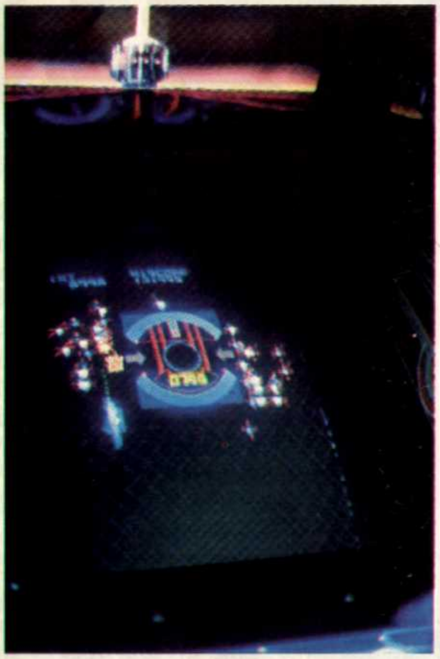
A good idea is to start off this board with the trigger of the joystick pressed to give you maximum speed. Quickly turn to the left and then go to the top of the screen. Cut right, wrapping around where the enemy cycles began. By entrapping the enemies in this way, you force them into a very limited amount of space which they quickly use up.



You will never encounter more than three enemy light cycles on the same board. This section of Tron does get harder as the game progresses, because the enemy becomes faster and more evasive.

### Tank Maze

To do well here, you must know that the enemy tanks can fire only on the continuous blue trails that line the floor of the maze. Tanks cannot shoot through the pink diamond in the center of the screen, but you can. You can also bank your shots off the walls of the maze. This is your big advantage in defeating the tanks.



The pink diamond is a teleport station that should be entered only to escape certain death. When you enter the diamond, you are transported to a random point in the maze, thus disorienting you for a second—long enough to be blown to bits.

To destroy a tank, you must hit it three times with your cannon blasts. To lose a tank yourself, you need be shot only once. If you score a hit on a tank, it is scarred with a red flame.

The first time you encounter a tank, you should have no problem disposing of it. The second time you enter the Tank Maze, there will be three tanks. Obviously this will be a bit harder. You must learn to bank shots successfully to eliminate tanks without exposing yourself.

If you are fighting more than one tank, position yourself at one end of a corridor with an escape route to one side. Before the enemy tank enters the same hallway, fire shots in its direction, and then change position. If your timing is good, you should be able to score two hits before the tank can get a good shot at you. Finish off the wounded tank with one final shot and move on to your next target.

Remember, a shot from a tank remains lethal even after the tank it was fired from has been destroyed. Don't fall prey to the "dying shot syndrome." Nothing is more disappointing than being killed just as you finish off the last tank.

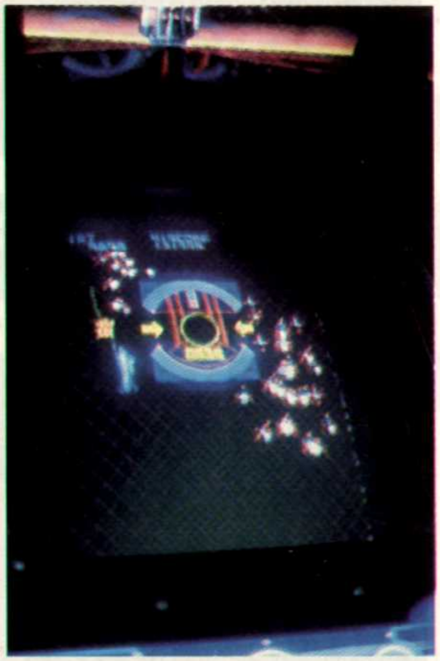
### I/O Tower

Your opponents on this screen are the grid bugs and time. When the action starts, the counter below the green circle begins counting down. When it drops below 100, a loud warning sounds. If the counter reaches zero, you die.

The grid bugs are fairly easy to defeat. The trick is to get close to a batch of them and start firing like crazy.

Blast away at the clusters of bugs before you start exterminating with discretion. When you see that you have a clear path to one of the side doors to the tower, move up to the door, but do not enter yet. Keep on firing at the bugs, even if they don't pose a threat to you. Killing bugs on the second and third rounds provides for a large increase in your score without risking your life.

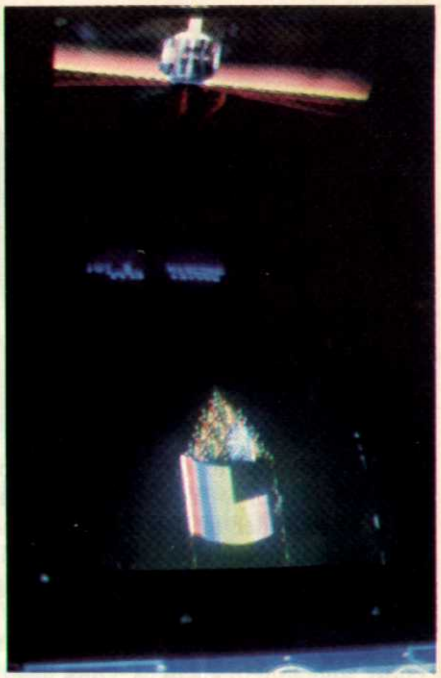
Wait until the warning buzzer goes off before you enter the tower, otherwise you will forfeit great point scoring opportunities.



### MCP Cone

This screen is really a strange variation on Atari's classic game, Breakout. The object here is to enter the MCP—the fuzzy dots at the top of the cone.

First off, move up as close as you can to the revolving blocks. Fire your frisbees as fast as you can, while moving down with the descent of the cylinder. Attempt to blow open a diagonal hole in the revolving cone. Continue to fire on this diagonal and you will slowly destroy every block.



When all the blocks are gone, you automatically slide up into the MCP. You are awarded 1000 points for entering the MCP and an additional 1000 points for destroying all of the colored blocks.

Even though the speed of the revolving cone is increased, it is still posible to eliminate all of the blocks on the second round. Follow the same basic pattern for clearing away as many bricks as you can until you realize you can't move down any further. Quickly make a dash for the MCP, but stop short of entering it. Point your arm down at the bricks and continue to fire at the ones below your feet. When its time comes, the MCP will have moved down as far as it will go and you will be forced to enter it.

The thing that takes most players by surprise on the third round is that the cylinder is spinning counterclockwise, instead of clockwise as in the preceding rounds. Just knowing this ahead of time will help. Disregard the tips given for the earlier MCP rounds. The most important thing here is to punch a hole in the bricks quickly and move to the MCP as soon as you can. When you are passing through the blocks, don't forget to move with the flow.

Well, now you should have a good idea of how to take command while playing Tron. Let's hope you fare as well as Flynn did in the movie; he escapes the clutches of the program. (Whoops, did I just blow the movie for you? Sorry.) ■

# Mastering VICTORY

Reprinted with permission
from Exidy, Inc.

Welcome to the excitement of Victory. You are the commander of the Battlestar, the most maneuverable spaceship in the universe. Victory can be yours by learning the simple tricks detailed below.

The object of Victory is to eliminate an entire squadron of enemies. Once this is done, you are promoted to a higher rank and given better weapons to conquer a new, fiercer level of enemy squadron.

You steer your ship, named Battlestar, through space to seek and destroy enemy craft. The cockpit window takes up the largest part of the screen, and is where the most colorful combat action takes place.

To see the entire world view beyond the cockpit window, you must refer to the radar scope in the bottom right-hand corner of the game screen. This is a miniature picture of the entire world, in one-eighth scale. Each craft in the world is shown by a colored "blip," or dot. The Battlestar is shown as a white blip and is always in the middle segment of the radar scope. The middle segment makes up the cockpit window. The world on radar "wraps around." If an enemy moves off the right edge, it comes back on the left edge.

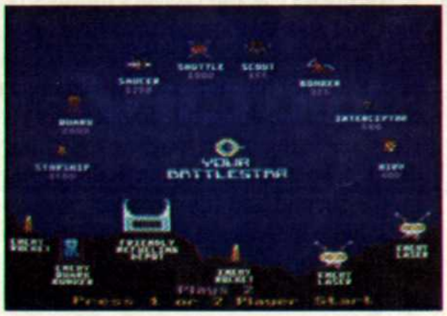
Some enemies are not shown on the radar (rockets launched from ground, and bullets from enemy ships). For this reason, you must look at both the radar and cockpit window to know exactly what dangers you are facing.

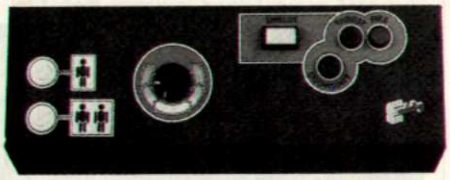
### Controls

There is a variety of control instruments on the Victory machine. You must learn what each does and how to use it efficiently.

Pressing the thrust button moves Battlestar in the direction it is facing. The longer this button is depressed, the faster your ship will go, until it reaches terminal velocity.

Victory uses a weighted knob to control the steering of Battlestar and the direction of gunfire. Turning the knob always turns the facing of the gun. However, to steer the ship, you must use both the knob and the thrust button.





Pressing the fire button launches a burst of rockets from your ship. You have an unlimited supply of ammunition, so don't worry about shooting too much.

VICTORY
Exidy

When things appear really hopeless, you can rely on the protective shields. Pressing the shields bar completely protects your ship from all forms of attack for three seconds. The amount of shield power is limited and is replenished only at bonus score increments.

Like the smart bombs in Defender, the Battlestar in Victory has a limited number of Doomsday devices. When you activate a Doomsday device, all of the enemies visible from the cockpit window are destroyed. Like shields, devices are replenished only when you reach a bonus score.

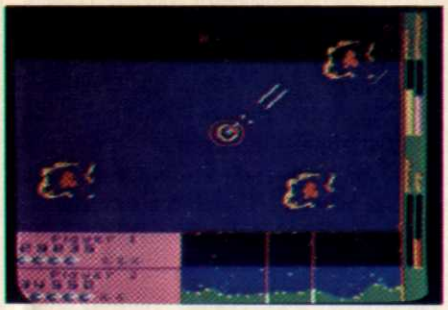
### Elements

As the pilot in Victory, you command Battlestar. You advance in rank after completing every squadron, until you attain the coveted title of Ace. As you are promoted, the weapons on the Battlestar become more deadly. See the chart for details.

The Battlestar is destroyed if it collides with any enemy ship, enemy bullet, land-based rocket, or the land itself. It is also destroyed if hit by land-based enemy laser fire. When your fuel runs out, all of the enemies zero in on Battlestar. Also, when the last (10th) Quark is released, all of the enemies attack, and the computer co-pilot warns "Red Alert!"

A bonus is awarded when you exceed preset high scores. The bonus levels begin at 35,000 points and proceed at increments of 65,000 from there on after. When you have earned a bonus, the computer co-pilot says "Bonus," and the following awards are generally given: one shield, one Doomsday device, one ship, and 1600 points. Both the bonus score and the award may vary due to operator-selectable options.

To see what your specific enemies look like, and what their point values are, see the accompanying photo.



### Strategy

To maintain a controlled speed that is not too fast, get Battlestar moving fast, then tap the thrust button at the same quick rate that you tap the fire button.

Don't waste the Doomsday devices or shields unless absolutely necessary. You must depend on these defenses later in the game when enemy encounters become more challenging.

The radar color codes enemies by their degree of danger. The redder the color, the more dangerous the enemy. See the color coding chart that starts with Quarks, the most dangerous enemy.

Each paratrooper is assigned only one Quark to release from its bunker. When dropped from its ship, the paratrooper is aimed at a land bunker where a Quark is contained. The paratrooper then turns into a green scout. Three seconds after it reaches the bunker, a deadly red Quark is released. The computer co-pilot warns "Yellow Alert," and the Quark heads straight for Battlestar. The green scout creeps along the ground until all but three enemies have been destroyed. He then heads for Battlestar.

Your first priority should be to go after the ships that are dropping paratroopers (bombers, intercepters, shuttles, and saucers). If you miss those, shoot down the paratroopers immediately. If a paratrooper releases a Quark before you get to it, the Quark will immediately attack. Sometimes it is safest to put up the shield the minute a Quark is seen. When you are safely shielded, blast the Quark out of the sky.

To destroy enemies that are chasing from behind, push Battlestar to its top speed, discontinue thrusting, turn to face the enemy, and shoot. Then turn the gun to its original position and continue in the direction that you are moving. This allows you to continue in one straight path, instead of flying into the enemy. Use the same technique on enemies in positions other than directly behind your ship.

| Spaceship | Color on Radar |
|---|---|
| QUARKS | magenta |
| STARSHIPS | red |
| MIRVS | red |
| PARATROOPERS | red (long blip) |
| INTERCEPTORS | red |
| SAUCERS | yellow |
| BOMBERS | yellow |
| SCOUT | green |
| SHUTTLE | green |
| ROCKETS | no blip |
| BATTLESTAR | white |

When the game begins, often all five bombers are flying from the left of the world to the right. To meet them head-on, steer your ship to the left, and the moment all five bombers appear on the cockpit window, hit the Doomsday button. After destroying the bombers, only one enemy need be eliminated at the Cadet level. This strategy also works for successive levels. ■

# Mastering Kangaroo

By Owen Linzmayer

A band of bad guys has kidnapped a baby, and you must rescue him—not a terribly unusual scenario for an arcade game, right? Right. But Kangaroo has a few twists that will keep claiming your quarters.

In Kangaroo, you are a mother kangaroo, and the baby you must rescue is being held by a gang of nasty monkeys. As in Donkey Kong, jumping is one of the keys to success. Kangaroo, however, takes the concept a step farther, offering a variety of jumps and the ability to punch your foes.

When Kangaroo first appeared in the local arcade, I put a few quarters into it, and believe me, those quarters didn't last long. It seemed that Atari had released a game that was far too difficult. My next course of action was to return to *Creative Computing* to beg for some "research" money. Then, armed with a pocketful of quarters, I returned to Kangaroo. It took all of my research money—and then some—but I can now say that I have mastered Kangaroo. You can too. And if you follow these tips it will cost you a lot less than it cost me.

PLAYER-1 LEVEL-2 PLAYER-2
023400
000000
Kangaroo
TODAY'S HIGH SCORE
023400
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CREDIT = 00

The object of Kangaroo is simple: you, the mother kangaroo, must rescue your baby from the gang of nasty monkeys. Along the way you can punch out the monkeys, ring bells, and eat fruit.

**Your baby kangaroo is being held captive in a cage by the mean monkeys.**

Kangaroo features a six-position joystick which the player uses to make

Mom hop right or left, jump or duck, super-leap to a higher platform, or climb ladders. The "Punch" button is pressed when you want Mom to punch out a monkey or a piece of fruit.

Your baby kangaroo is being held captive in a cage by the mean monkeys. You start each of the four screens at the bottom of the playfield. You are separated from your baby by a series of ladders populated by monkeys who fling apples and cores at you.

Luckily, you are not completely helpless. You can jump over or duck under the apples as they come flying by, but your big advantage is your ability to punch. If a monkey or an apple core is within reach, you can punch it for bonus points.

Along the way to saving Baby, Mom can also collect (punch) different kinds of fruit which are worth extra points. Figure 2 lists the punchable objects and the number of bonus points awarded for each. When Mom finally reaches Baby, bonus points are awarded according to the amount of time left as displayed in the upper left-hand counter. Each time you rescue Baby, you advance to the next round and have to do it all over again.

If you miscalculate a jump, you plummet to the bottom of the screen, and lose a kangaroo. You will also lose a life if you happen to get hit by an apple or an apple core.

Although the strategy for beating Kangaroo is pattern oriented, there are several things you should know in case you accidentally deviate from one of the patterns.

Jumping has two purposes: to move you around the screen, and to help you avoid a thrown apple. When you want to go from one platform to another, you must use the super-leap. To grab a fruit you can simply get under it and leap, or you can use a super-leap to reach it.

### SCORING

| Punchable Object | Points If Punched |
|---|---|
| Apple | 100 |
| Strawberry | 100 |
| Apple Core | 200 |
| Monkey | 200 |
| Tomato | 200 |
| Cherries | 400 |
| Stacked Monkey | 400 |
| Pineapple | 800 |
| Big Ape | 800 |

Figure 2.

Before jumping over an apple, you must determine if it is possible. The monkeys throw apples at three different levels: on the ground, at the level of your arm, and at the level of your head. All can be avoided, but only the first two can be jumped. To avoid a headache, simply duck under the high flying apples.

If you are waiting for something and you see an apple being thrown, wait until it gets close to you and then jump straight up. When you land you will be in the same position you were in before the jump. If, on the other hand, you are running toward the monkey that is throwing the apple, use a super-leap to jump over the apple. You can punch any apple or core that is at arm level.

**Disregard the bell unless you are planning to lose a life.**

Kangaroo is a relatively non-violent game. Nevertheless, you can punch out those annoying monkeys. If you decide to punch a monkey, you must get close to it, but not too close. If you are too close, you will collide with the monkey and lose a life. If you are too far away, the monkey will be beyond your reach. It takes a little practice to get a feel for the right distance.

Don't punch unless it is absolutely necessary. When you press the punch button, Mom goes into the punching routine, regardless of what is going on around her. If an apple happens to come flying by, she is totally defenseless.

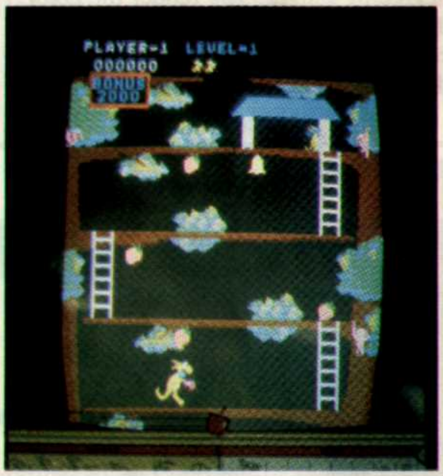
Watch the monkey on the top of each screen; he is the one who drops the apple cores. Pay close attention to this monkey as you get closer to the top of the board. Usually he just wanders around, but when he cocks his arm back, be warned that he is about to chuck an apple core.

If you use the above tips in conjunction with the specific hints for each round, you should be able to complete the first level with very little difficulty.

*Note:* For the accompanying patterns to work, you must not deviate from the path unless it is obvious that you will lose a life if you don't. Also, these patterns were devised to work the first time you attempt to complete a round on every level. If you are half-way through the second round and you lose a life, you must restart the round, but the computer will play it differently. Therefore, the pattern given is no longer valid, and you are on your own.

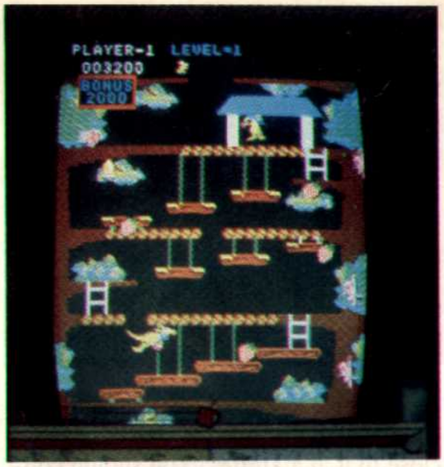
### First Round

1. Jump and get the first fruit, then move over to the right-hand side of the tree branch.
2. Punch the monkey on your right and then climb the ladder.
3. Turn to the right and move forward as far as you can. Punch the monkey as soon as it climbs down into your reach.
4. Turn around and move left.
5. Use a super-leap to grab the fruit and then climb the ladder. Once you get to the top, move to the right.
6. As you hop, grab the first fruit. When you land, move under the bell. A monkey should be fast approaching your position.
7. Punch the monkey when it is within arm's reach. Then go over to the base of the ladder.
8. If a monkey is climbing up or down the tree trunk to your immediate right, punch its lights out. If not, climb to the top of the ladder and run over to grab your baby. If all went well and you followed the path with good timing, you should receive a bonus of about 1700 points.



### Second Round

1. Turn to the left and jump up onto the first platform.
2. When you are firmly on the platform, turn around to face right. Using super-leaps, hop your way over to the ladder on the right and climb it.
3. Move to the right, and grab the hanging fruit. When you land, punch the monkey that is climbing down the tree trunk. Turn around and move to the left.
4. If the monkey behind you is about to throw an apple, wait until you dodge it. Once it is clear, use a super-leap to jump the break in the platform. Hop over to the base of the ladder and climb it.
5. Move over to the edge of the platform. Jump straight up to grab the fruit. Once you have done this, use a series of



super-leaps to get to the very short ladder. Climb the ladder.

6. If a monkey is to your right, punch it. If not, move to the left and jump the break in the branch. It is important to keep an eye on the topmost monkey as he may drop a core at any time.

7. Disregard the bell unless you are planning to lose a life. Using three super-leaps, get to the base of the ladder.

8. If no monkeys are within reach, climb the ladder and rescue Baby Kangaroo.

### Third Round

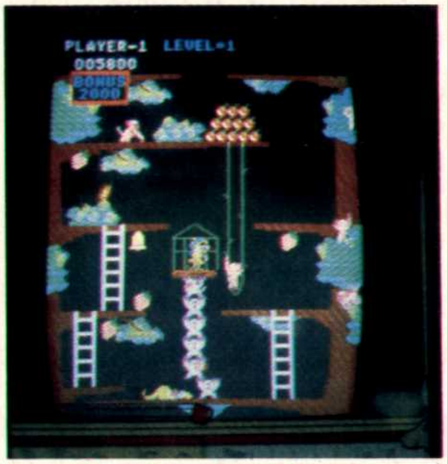
Warning: Kangaroo machines, like most arcade games, have operator-selectable options. Some commonly selectable elements include: number of lives, points needed to receive an extra life, and difficulty levels. Kangaroo can be set to play an easy game or a more difficult one.

If, before the third round, there is a demonstration on how to punch out the stacked monkeys, your machine is on the easy setting. If there is no such demonstration, urge the operator to change the setting, otherwise you will probably have a great deal of difficulty completing this screen.

The third round is the easiest round of all, because it can be completed with one super-leap. When you appear on the screen, don't move—not an inch. Just sit there and punch away at the stack of monkeys.

There are only two things that can happen to you as you punch out the monkeys: an apple can be thrown at you or a core can be dropped on you. The thing to keep in mind is, keep punching away unless one of the above situations occurs.

If an apple is thrown at you, punch, duck, or jump over it—don't move.

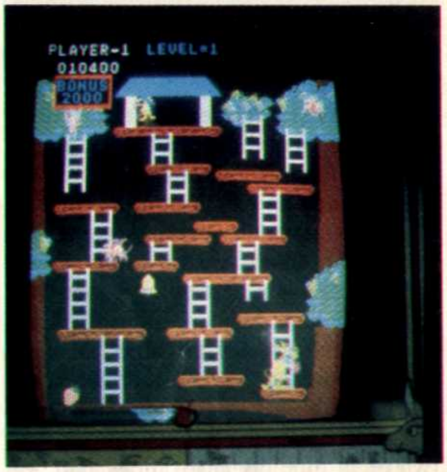


Once the apple has been dodged, continue punching. If a core is heading for you, you must move. After you side-step the falling core, return to your position near the stack of monkeys.

When all of the monkeys, save one, have been punched from beneath the cage, you can use the super-leap to jump into the cage and rescue your baby.

### Fourth Round

1. Hop over to the bottom right platform and jump onto it. As you hop over, you will automatically collect the fruit.



2. Climb up the ladder when it is clear. When you are at the top, walk to the left, allowing yourself to drop down onto the adjacent platform.

3. Again, climb the ladder and when you are at the top, jump onto the platform to your left.

4. Climb the short ladder, then jump to the right platform.

5. Jump onto the platform on your left and climb the two ladders leading to your baby. When you touch your baby, you will have completed Level One.

Good Luck and Happy Hopping. ■

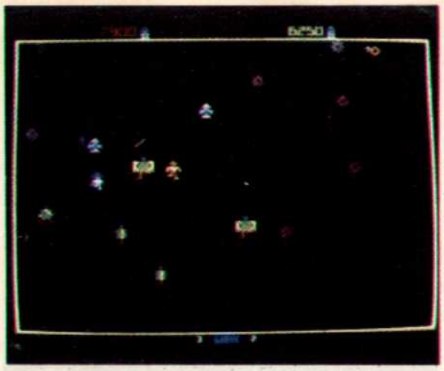
# Mastering ROBOTRON: 2084

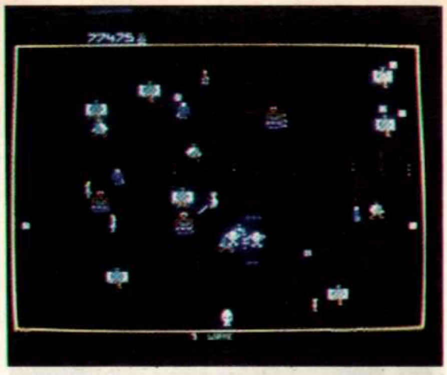
By Owen Linzmayer

Robotron 2084 is unlike any other video game around. Designed and programmed by Eugene Jarvis, the creator of both Defender and Stargate (all manufactured by Williams Electronics), Robotron is one of the most dazzling arcade games released in 1982.

Eugene's games are unique; they have attracted a following of players who like a special amount of freedom in their games. People who play Jarvis games become devoted to them. Eugene likes to reward players who do well, therefore all of his machines award bonus men at specified point multiples, and they keep on giving away extra men as long as the

**Just like a shark, if you stop moving, you are sure to die.**





player can reach the next multiple. Along with freedom of movement, and unlimited bonus men, Robotron boasts stunning graphics and an exhilarating pace.

As in almost all video games, the object of Robotron is to earn points. Points are awarded for destroying robots and saving humans. Most machines are set to start off a game with three "lives." When all of the player's men are gone, the game is over.

The controls on Robotron consist of two eight-directional joysticks. The left stick controls the movement of the player on the screen; the right one fires the anti-robot machine gun. In Robotron, unlike Berzerk, you can move in one direction and shoot in another.

The scenario for Robotron is as follows: In the year 2084, technology has become so advanced that our own creations, the robots, decide that the human race is expendable. They determine to reprogram or destroy every remaining human on the planet.

It is up to you to stop them. You must save as many humans as possible, by simply running your man over them. All robots, with the exception of the Hulks, can be destroyed with a single shot from your gun. Running into anything other than the walls or humans results in your instantaneous death.

As the game begins, the robots materialize on the screen before you. Use this time to pick a target area to attack. It is best to blast your way to the edge of the screen; with one of your sides protected by the wall, only three sides are vulnerable to attack. Once you appear, start wasting the robots with your laser gun. Even if there is a clear path to the edge, continue to fire at the robots as you move. The most important thing to remember about Robotron is that firing is independent of movement. This means that while running in one direction, you can shoot in another. Never stop firing unless you are about to clear a board, but want to save a human first.

The only way to earn really big points is to save as many humans as possible. The first human you rescue is worth 1000 points; each one after that increases in value by 1000 points until they reach a maximum of 5000. Most machines are set to award a bonus man at every 25,000 points. Any machine that is not at this setting is not worth playing; refuse to deposit a single quarter in it.

With a free man at every 25,000 points, you need save only seven humans to win an extra man. Thus, it is very important to save the humans. After you lose a man, or at the beginning of every new board, the value of the humans starts off again at 1000 points.

Don't spend too much time in one place; keep moving. The best technique is to circle around the perimeter of the screen while constantly firing into the center at the robots. Just like a shark, if you stop moving, you are sure to die. On every ninth screen you must battle an awesome number of Grunts—over a hundred robots on the screen at one time. This screen usually relieves most players of at least one man, although it need not.

As the robots materialize, look for the area with the lowest concentration of them; this will be your path to the side of the screen. Point your man and aim your gun in that direction before you appear on the screen. Once you materialize, start firing and moving—without hesitation.

If you successfully reach the edge, start your circular sweep of the screen; shooting the Spheroids as you do. Don't slide along the outside wall, but stay close to it at all times. You should complete this screen after about two passes around the playfield.

ROBOTRON
2084

When there are only a few robots remaining in an attack wave, and some humans are still wandering around, don't complete the wave by shooting the robots. First, rescue the humans. You may have to do some fancy footwork to avoid shooting the last remaining robot, but the points you gain by saving even one human are worth the effort. Remember, it is acceptable to place your man in jeopardy from time to time, because you can always win another.

By following these tips and understanding your enemies' strengths and weaknesses, it is easy to rack up points in the hundreds of thousands. The following are profiles and hints on how to beat each of the robots you encounter while playing Robotron.

### Electrodes

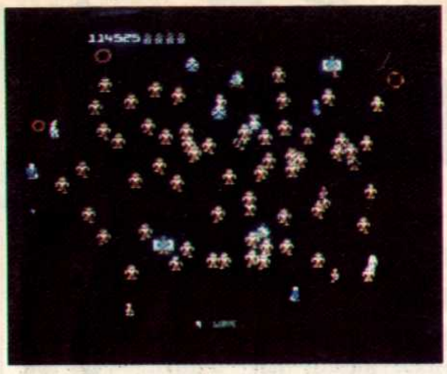
These immobile obstacles are not robots, but are still deadly on contact—to both you and Grunts. In each new attack wave, the Electrodes change shape, but they remain lethal. Shoot any that are in your way. You don't get any points for this, but it is easier than maneuvering around them.

### Grunts

These robots appear in overwhelming numbers. They are programmed to converge on your position and crush you. Rather than spending time picking off Grunts one by one, blast at them when they are in groups. Their movement is easy to predict, so lead Grunts into Electrodes, and watch them explode.

### Hulks

The Hulk is the only species of robot that is truly indestructible. Hulks kill humans (and you) with a single touch. Your laser blasts can only slow down or divert a Hulk. If one is about to run into a human, shoot at the Hulk in an attempt to turn it from the human. Stay away from the walls when Hulks are nearby; they



can easily turn and crush you as you try to sneak by them.

### Spheroids

Although they don't pose much of a threat themselves, Spheroids release deadly Enforcer Embryos. Hence, the red, pulsating Spheroids should be destroyed as quickly as possible. They should almost always be your primary targets. If you shoot a Spheroid, it disintegrates and can't release any Embryos. The thing to remember is that, due to a programming oversight, Spheroids tend to get stuck in the corners of the screen—this is highly beneficial to you. With precise aim, you can shoot at three corners from the same position and knock out most of the Spheroids.

### SCORING

| Object | Point Value |
|---|---|
| Spark from Enforcer | 25 |
| Shell from Tank | 50 |
| Missile from Brain | 75 |
| Prog | 100 |
| Grunt | 100 |
| Enforcer | 200 |
| Tank | 300 |
| Brain | 500 |
| Spheroid | 1000 |
| Quark | 1000 |
| Human saved | 1000-5000 |

### Enforcers

Embryos spawned by Spheroids grow into Enforcers. The main weapon of an Enforcer is its ability to launch Sparks at you. The weakness of the Enforcers lies in the fact that when you are close to them, the Sparks they emit travel slower. Sparks tend to slide along the walls, so stay away from the edges if Enforcers are firing at you.

### Brains

These guys are the most dangerous Robotron opponents you can face. Fortunately, they appear only every fifth wave. Brains should be your primary target whenever they appear. They are extremely deadly, because they fire Cruise Missiles that chase you around the screen. To destroy a Missile, run from it while simultaneously firing at it. Brains also possess the power to reprogram humans into kamikaze-like Progs. By simply touching a human, a Brain can transform him into a deadly Prog, which runs around aimlessly like a chicken with its head cut off.

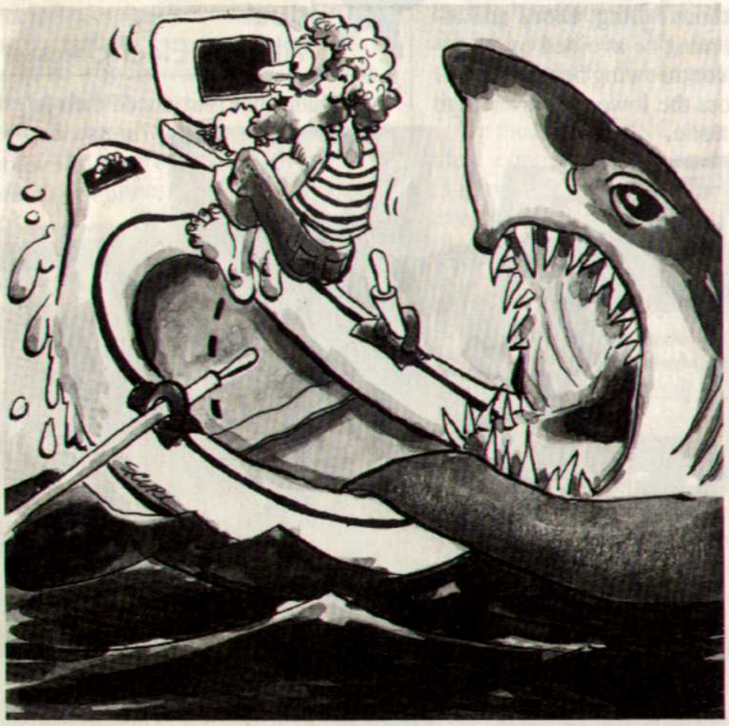
### Quarks

These are very similar to Spheroids, but their shapes and contents are different. Quarks are square and contain Tanks. Unlike Spheroids, Quarks don't get caught in the corners.

### Tanks

These are your second most deadly opponents; they are surpassed only by the Brains. Tanks fire Shells, which rebound off the walls. On boards with Tanks, go to the edge of the screen, preferably near the middle. Shells can make some pretty unpredictable bounces, and if you are near a corner, you may get hit. Fire at every Tank within range while picking off the Shells as they approach you. The problem most people have is that they don't recognize each Shell as an individual opponent—it is, and should be treated as such. ■

**Q: What is the hardest thing in the world?**
**A: Tearing yourself away from an EPYX game.**



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# NEW COIN-OP ARCADE GAMES

By Owen Linzmayer

Every time I walk into my favorite arcade, it seems as if the operator has just installed two or three new video games. I barely have a chance to become mildly addicted to one machine, and suddenly I'm tempted to play these flashy new games.

I wish game manufacturers would slow down their production, it's making it really difficult for me to choose a favorite coin-op game. This article contains descriptions, supplied by the manufacturers, of the most promosing new games for 1983.

## Jack the Giantkiller
### Cinematronics

Cinematronics has announced a new raster scan game, Jack the Giantkiller. This game offers "exciting, fast-paced action" with full color graphics and a full complement of sounds and music.

Jack the Giantkiller is said to be filled with new surprises that continue to challenge players. Difficulty levels are marked by the number and types of adversaries faced by the player as the game progresses.

Enthusiastic players help Jack in his perilous journey up the beanstalk to retrieve treasures and rescue the princess from the giant's castle.

Travel up and down the beanstalk is fraught with obstacles that add to the challenges of the game.

The dangers of climbing the treacherous stalk are magnified by the various creatures that attack Jack to keep him from reaching the top. Rewards for completing each phase of the climb include both scoring opportunities and special animated cartoons.

The action is enhanced by the continuous introduction of new elements to the game play. Twelve different levels of difficulty are included to challenge the player and maintain interest.

There are five different scenes of action that Jack encounters in his journey to retrieve the treasures. Each scene offers a different type of action.

Scene 1—JACK CLIMBS THE BEANSTALK from his cottage through the thick mazes of leaves. Jack can pick beans and use them as ammunition against various attackers.

Scene 2—JACK ENTERS THE CLOUDS and carefully makes his way to the castle without falling. Lions and attacking birds must be avoided by jumping over them or throwing beans at them. Jack must cross the lowered drawbridge to enter the castle.

Scene 3—JACK CLIMBS THE CASTLE STAIRWAY leading to the giant's room. There are missing stones and falling steps that Jack must avoid as he runs and leaps up the stairs.

Scene 4—JACK ENTERS THE GIANT'S ROOM and climbs platforms and stairs to reach the top of the table where the treasures are. Three treasures and the princess are waiting to be retrieved. After getting the item that is flashing, Jack must return home safely.

Scene 5—JACK CLIMBS DOWN THE BEANSTALK with his treasure, and tries to reach his cottage safely. After rescuing the princess, Jack chops down the beanstalk. He then begins his adventures again at a higher difficulty level.

For the first time, Cinematronics is offering 3"x5" player tip cards that give hints on how to play Jack the Giantkiller. To obtain these cards, ask your local game room operator to contact Cinematronics.

## Joust
### Williams Electronics

Williams has introduced their latest in-house designed and developed video creation, Joust.

JOUST
JOUST
Moon Patrol
Pepper II
ZEKTOR

Williams' dual-player Joust offers arcaders the opportunity to challenge each other in direct, head-to-head competition or to team up against a common enemy—the game itself. One person can play alone, but, when two play, the game becomes even more intriguing, increasing the possibility of reaching higher waves and taking on new challenges.

Players start their journey into the mythological world of fantasy and fun mounted on an ostrich or a stork. Each player, manning a "flap button" and a joystick, flies his bird toward enemy riders astride buzzards and attempts to unseat them.

A successful Joust scores points for the player and turns the enemy into a egg that must be picked up before it hatches into an even more dangerous adversary.

Later in the wave, players must beware of a deadly pterodactyl which emerges, swooping down to keep the players jousting until all of the enemy are defeated.

As play progresses, fire consumes the bridge on both sides of the bottom ledge, leaving smaller and smaller areas in which to land, and a "lava troll" takes shape, reaching its deadly grip up to grab anything that dares to fly over its den.

To make the play even more interesting, the second wave and every fifth wave thereafter are Survival Waves. Players are rewarded with 3000 points for not losing any riders during these waves. Every fifth wave is an Egg Wave in which players earn extra points by picking up as many of a dozen eggs as possible before they hatch.

In dual-player action, players move into more sophisticated and intriguing waves and have more strategy decisions to make, such as whether to play together against the enemy riders or to play against one another. Wave two and every fifth wave thereafter become Team Waves with 3000 points (adjustable) awarded to both players for teaming up and not unseating one another.

Jack the Giantkiller
SUBROC-3D
3DIMENSION TV
SEGA

The exact opposite holds true for wave four and every fifth wave thereafter. These are Gladiator Waves. Here the bonus points are used to encourage the players to Joust against each other and are awarded to the first player who is successful.

To add realism to the intense challenge and competition, Joust also features outstanding graphics, animation, and sound effects in a crisp clear colorful package.

## Moon Patrol
Williams Electronics

Williams has also introduced the intriguing new video offering, Moon Patrol. According to Williams, "the striking realism and perspective of the screen graphics set the background for the multiple challenges players will face as they attempt to patrol uncharted terrains of the moon."

Moon Patrolers must race to beat the clock as they maneuver tanks from checkpoint to checkpoint. Beating the average time earns big bonus points and scoring points along the route entitles the player to another tank.

Tankers must use all of the controls at their disposal to maneuver the tricky tanks. A joystick accelerates the tank from slow to medium to fast forward. A jump button causes the player to leap over the ground level traps, and a trigger button simultaneously fires missiles straight up at the invading UFOs and straight ahead to disintegrate obstacles in the path.

On the Beginner's Course, the patroler must contend with mammoth boulders that must be either blasted apart or leapt over. Almost immediately, space ships, flying saucers, and UFOs appear on the scene dropping missiles and bombs. The player faces territories studded with land mines and alien ground force tanks shooting cannons dead ahead.

If the player can handle all this action and make it to the end of the Beginner's Course, he progresses to a more difficult route—the Champion Course. In this segment of his patrol, wilder and more exotic confrontations await him. He must beware of fast rolling rocks skidding along the terrain at an incredibly fast pace, not to mention volcanoes about to erupt. He will also meet low flying alien planes that sneak up behind his tank.

Each new section of the moon that is conquered is a challenge. If a player loses all of his tanks, he has the option of proceeding from where he left off or starting back at the beginning of the course if he wants to play again.

## Pepper II
Exidy

Exidy has announced the release of its newest game, Pepper II. Pepper II is a colorful secret maze game, in which the player controls Pepper, a character who is usually an angel, but at times assumes a devilish guise. Pepper explores four sides of a cube for hidden areas, leaving tracks resembling a zipper as he goes. Once he has surrounded an area with tracks, a colorful pattern fills it in and points are awarded.

During his voyage, Pepper must avoid Roaming eyes as well as the Whippersnapper, a bright crimson enemy who "unzips" any of Pepper's tracks that have not fully enclosed an area when he strikes. When Pepper encloses an area containing a pitchfork, he turns into a devil for a few seconds. In that condition, he can capture the Roaming Eyes for points. The Whippersnapper, however, remains a deadly threat.

The catchy tune and exciting game play of Pepper II are designed to appeal to players of all ages.

## Subroc-3D
Sega/Gremlin

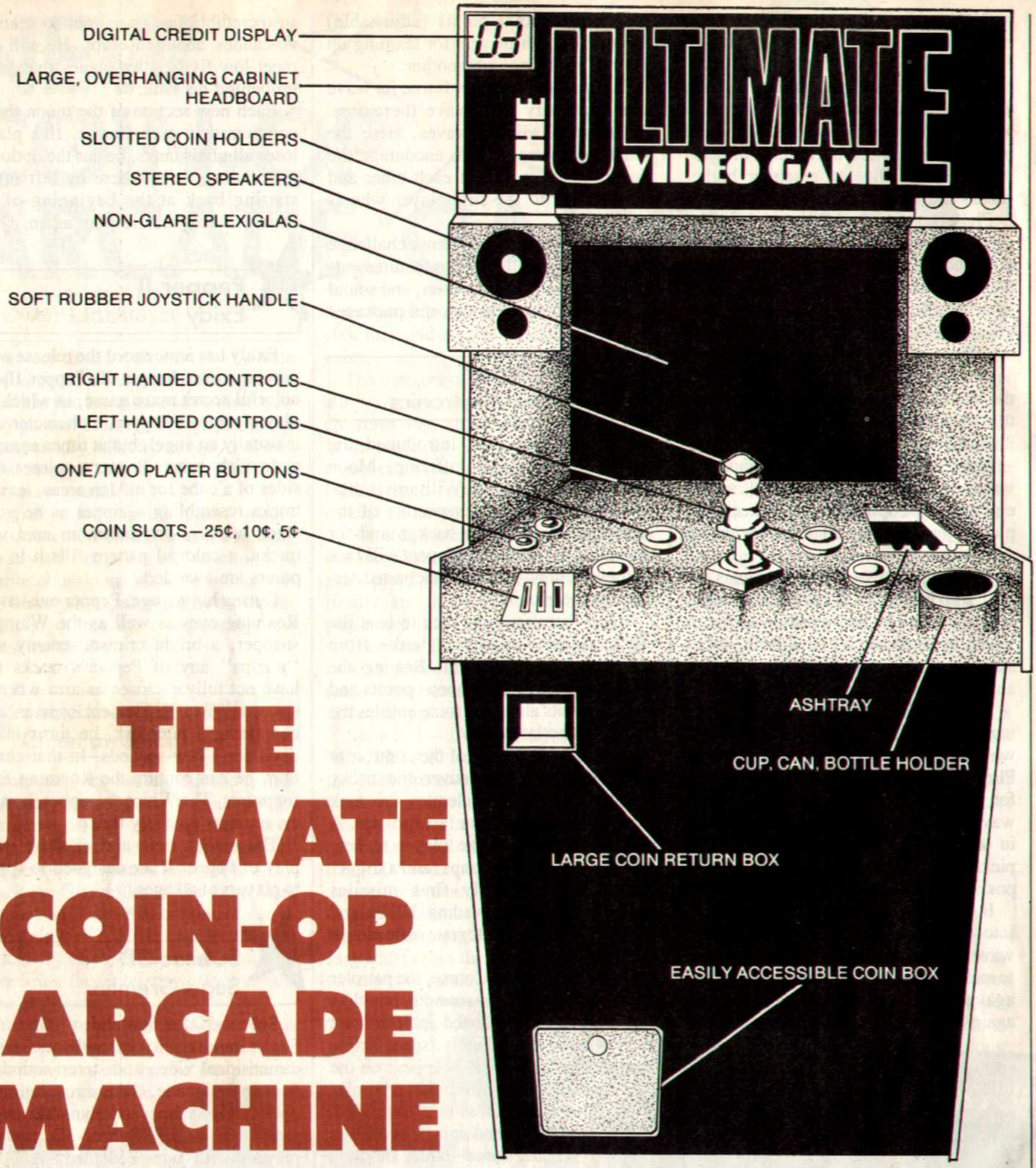
Subroc-3D, a new video game from Sega/Gremlin, brings authentic three-dimensional video and stereo sound effects to the arcade. Using a revolutionary optical viewscope and dynamic stereo sound techniques, Subroc-3D provides players with unprecedented sight and sound realism in a futuristic air and sea battle adventure.

The action takes the player through day, dusk, night, and dawn sequences in an array of 3-D graphic and color changes.

The object of the game is to score points by defeating a barrage of enemy warships on the sea and in the air and to destroy the elusive, barrier-protected

*Continued on page 45.*

# THE ULTIMATE COIN-OP ARCADE MACHINE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03
THE ULTIMATE VIDEO GAME
ASHTRAY
CUP, CAN, BOTTLE HOLDER
LARGE COIN RETURN BOX
EASILY ACCESSIBLE COIN BOX

ILLUSTRATION BY CHRIS DEMILIA

**By Owen Linzmayer**

It's no secret that video game manufacturers are making mountains of money. Playing arcade games is among the most popular forms of entertainment today. Thinking of millions of people pumping billions of quarters into video games prompted me to wonder what the game manufacturers have done for the players.

Picture yourself entering your local arcade and sidling up to your favorite game. You dig deep into your pockets, fish around, ignoring the lint, and finally draw forth a quarter. To insert the coin, you must bend down and hunch over. Is this really inconvenient? Sure it is. But wait, there are more inconveniences and distractions you probably overlook every time you play.

What about glare, small joysticks, cigarette-scarred faceplates, and inaudible sound effects? When you get right down to it, you are the client of the video game manufacturer. You are renting his machine for a period of time.

If you were renting a car, would you be satisfied if the seat wasn't adjustable? Or if there was no ashtray? What if you couldn't see out the windshield without sitting on a phone book? And what if there was, God forbid, only an AM radio?

Unless you are a true glutton for punishment, I doubt you would return to that car rental agency. Why then, do arcade game players continue to play poorly designed games? I don't know. I think something should be done about it. This article is my contribution to the cause.

If I were pressed to choose coin-op games at opposite ends of the player-friendliness spectrum, they would be Tron and Phoenix. Tron has, without a doubt, the most innovative cabinet design I have seen in a long time. The people at Midway obviously spent a great deal of time and effort to make their game unique.

**Why can't the manufacturers be nicer to us—the source of their bread and butter, not to mention their Porsches and swimming pools?**

Centuri designers, it appears, were charged only with creating a functional console. "Functional" is the kindest word I can think of to describe the cabinet of the Phoenix machines. The control board is placed at a strange angle that forces players to bend over just to play. In addition, the place to which your palms fall most naturally is covered with a sharp edge. Why can't the manufacturers be nice to us—the source of their bread and butter, not to mention their Porsches and swimming pools?

The advantages of producing a "friendly" machine would be many. First, if a machine is easy to put quarters in and the controls are comfortable, players will be inclined to play longer.

The second, and perhaps the most important advantage, is that players will respect a game manufacturer who recognizes his customers as humans. If players feel respected and cared about, a more harmonious relationship will evolve between the manufacturer and his customers.

The most significant aspects of my dream machine are explained below. I have attacked every problem and inconvenience that I encounter while playing video games. If you have any further suggestions, please drop me a line, I'd like to confirm my conjecture that most people have pet-peeves when it comes to video games.

### Coin Slots

To eliminate the bending and hunching to insert your quarter, I would place coin slots at the side of the control panel. In addition to quarters, the machine would accept nickels and dimes. Many arcades are not equipped with machines that change other coins into quarters, and this would allow people to spend all of their change.

### Coin Return Box

One problem I have found on many arcade games is that the coin return box is too small—so small in fact, that even little kids have quite a time getting their money out. The reason the manufacturers did this was to prevent people from flinging coins up the return slots and triggering the credit mechanism, but I think the design could be improved. The coin return box should be placed in a logical, visible spot. It should be large enough for at least three fingers to be inserted.

### Coin Box

Although this would do nothing for the players, the arcade operators would appreciate large coin boxes. There would be one large drawer which could be opened, and inside the operator would find three removable plastic jugs. Each jug would contain only one denomination of currency. There are jugs like this in the upright Eliminator cabinets from Sega/Gremlin.

### Credit Displays

Once you had inserted enough coins for a game, the credit counters would automatically advance by one. There would be a continuous counter on the video screen itself and another display mounted on the headboard. The overhead counter would be a courtesy to other players who might want to know if you have already pumped a roll of quarters into the machine. Instead of waiting around wondering whether this was your last game, they could easily see how many games you had left.

### Joystick

Although many games today have joysticks, most suffer from the same problem: they aren't easy to handle. The joysticks found on both Gorf and Tron are the nicest I have seen. My machine would have a large joystick, similar to that found on Robotron. The main difference between my joystick and the others on the market would be that the top part would be made of a soft, yet durable rubber compound. Many players get blisters and callouses from extended play periods; my joystick would put an end to that.

### Dual Controls

As a courtesy to south-paws, my machine would be equipped with two sets of controls; one for right-handed people, and one for lefties. As far as I know, the first coin-op machine to implement this was Berzerk.

### Ashtrays

Many faceplates are destroyed by cigarette burns. I would have a stainless steel ashtray built right into the machine. This would encourage players to place their cigarettes in the tray, rather than propping them between two buttons. The tray would be easy for the operator to remove and empty.

### Glare Prevention

Glare is the bane of all arcade game players. A perfectly good game may be made unplayable simply by its positioning. I can think of three things that, when combined, should practically eliminate glare. First, the cabinet headboard should be large and overhanging. Second, the monitor should be almost vertical. Third, non-glare plexiglass should be used over the screen.

### Speakers

In addition to the video, the audio on my machine would also be greatly improved. Sound effects would be in stereo and would come from speakers located at ear level. Too many games have the speaker located near your knee caps.

**Many players get blisters and callouses from extended play periods; my joystick would put an end to that.**

### Coin Holders

On the sides of the headboard would be slotted quarter holders where people could place their money. Arcade etiquette says that when you place a coin on a machine, you get the use of the game when the current player is finished. So the current player would not be annoyed by kids reaching in front of him to "put their quarters up," these slots would be out of the way. They would also be tilted to that the quarters would not come raining down on the player if the machine was bumped.

There you have it: a design for a perfect arcade machine. Now all we have to do is find a manufacturer. Is anybody listening? ■

# Brother Can You Spare a Token?

**By Owen Linzmayer**

ILLUSTRATION BY WALTER GALLUP

There is something new rolling into the arcade today. It is not an innovative video game; it is a token. To a commuter or a city dweller who rides public transportation frequently, a token is nothing new, but to an arcade game player, having his dollar converted into three or four tokens may be quite a surprise. This article will help you understand what tokens are, and why they are used instead of quarters.

A token, according to Webster, is "a piece of metal issued for currency with a face value much above its real value." In many arcades, you receive a token in exchange for a quarter. That token functions in specially converted games just as a real quarter does in most other coin-operated machines.

The tokens themselves are manufactured in large quantities out of very inexpensive materials. Most have some form of message stamped on their surfaces to remind you what they represent and where they can be used.

Why would anyone want to use a token in the first place; isn't a quarter just as good? Not to most arcade hall owners. Tokens offer many advantages in the arcade. Most of these advantages benefit the game room operators, but some help the players as well.

### Don't Spend It All In One Place

The problem with quarters is that you can spend them anywhere you like. If the manager of an arcade hall goes to the trouble of breaking a dollar for you, he wants those quarters—all of them—in his machines. Unfortunately, there is nothing that forces you to spend them at his establishment.

If, however, you receive tokens that are honored only in his establishment, you have no use for them elsewhere. In such cases, you usually feel obligated to spend them right there and then. Americans, being an orderly people, don't want strange tokens jingling around in their pockets all day long, so they spend them to simplify their lives. This is exactly what the operators want.

> **Somehow, parting with a token is not quite as painful as parting with a quarter.**

Another inducement to spend is the feeling that tokens are "play money." Somehow, parting with a token is not quite as painful as parting with a quarter.

If you go to an arcade in which the machines accept only tokens, you can bet the owner is raking in more money than he would if the machines took quarters.

### It Takes Guts

Arcade machines don't come from the manufacturer ready to accept tokens; they must be converted. Let's say you have just opened an arcade, and you want to use tokens instead of quarters. You could just grab a copy of *PlayMeter,* the largest trade magazine of the arcade industry, and start flipping through the pages looking for the right ad. A few phone calls later, you will find yourself paying someone to convert the coin mechanisms to accept tokens.

Some mechanisms are fancier than others; it all depends on the tokens to be used. Some tokens are merely metal

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disks that vaguely resemble coins, whereas others may have little grooves cut into them. Tokens themselves are not universal. You can't take any token and use it in any arcade machine that is adapted to receive tokens; the coin mechanism itself must be designed specifically for that type of token.

### In With The Good, Out With The Bad

One of the worst ailments that can strike an arcade game is a jammed coin mechanism. Obviously, if a machine can't accept coins, it can't be profitable. A coin mechanism can fail if an imperfect coin is placed in it. At best, this happens rarely. But, every time it does happen, it costs the owner money in the form of lost revenue.

Tokens have the advantage that they are used solely for vending machines, thereby avoiding the misuse to which common coins are subject—how often have you tried to remove a screw with a token? Since tokens lead a rather pampered life, they tend to last longer. If a token is somehow damaged, it can be replaced with another inexpensive token.

Because tokens are less likely to jam machines, game players find more games in working order.

### Keeping An Eye On Things

Tokens also offer the owner the opportunity to monitor his profits more carefully. Most managers agree that it is hard to find trustworthy employees—particularly for a job that requires the handling of cash.

Giving an employee keys to the machines is risky in a hall where the games accept quarters. These keys allow access to coin boxes filled with quarters. If the games are filled with tokens, the manager can be less wary when handing over the keys.

Another advantage is that a machine full of tokens is less attractive to thieves.

### Something For Nothing

The owners of arcades obviously want people to play their games. Because tokens are so inexpensive to manufacture, they can be distributed as giveaways or freebies to induce players to try a certain game room.

Tokens also offer cheap advertising space. Most token manufacturers offer a variety of tokens with many slogans and messages on them; some will even print special messages, for a price.

### Conclusion

If you haven't seen a token yet, you probably will soon. It is a slow process, but more and more arcades are converting to tokens. Their advantages are many, and their drawbacks few. ■

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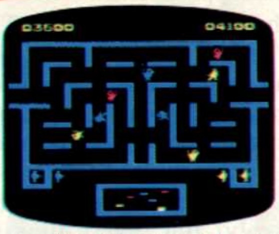
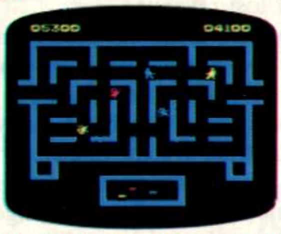


Vaporize the Burwors. Chase the Worluk.



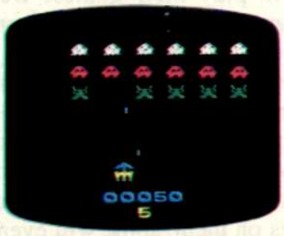
Until the Ultimate: The sometime-visible/sometime-invisible Wizard. Trust no one.

Wizard is designed so two may play at the same time. And since all's fair in Wor, even your best friend can zap you.

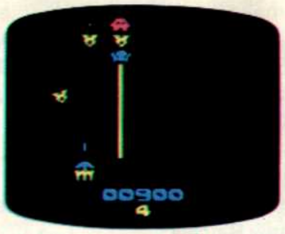
Now we don't want you to freak out totally, but if you're still up to the challenge, top the all-time, high score: 99,500 by Frank Merollo (10/82) and Buz Pryzby (8/82).

**GORF**

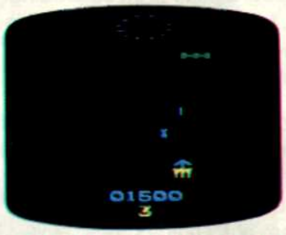
Can you hold up under the challenge of four different boards in one game? At nine different levels? Try and beat the high score of 32,700 by Horace Eckerstrom (9/82). No sweat? Well, what if we told you each level was faster than the last? Next time you'll think before you speak. But now you must face:



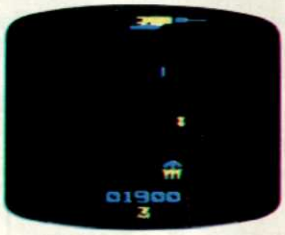
Gorfian bombs.



Kamikaze crazies & Laser Ships.



Deadly Subquark Torpedoes.



And finally: The dreaded Neutron Flagship.

Gorf's not easy. There's only ONE vulnerable spot on the Flagship. But don't let a little neutronium bomb stop you from hitting it.

GORF
WIZARD OF WOR
CBS Video Games
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Now that you know what to expect, are you still up to the challenge of Wizard and Gorf?

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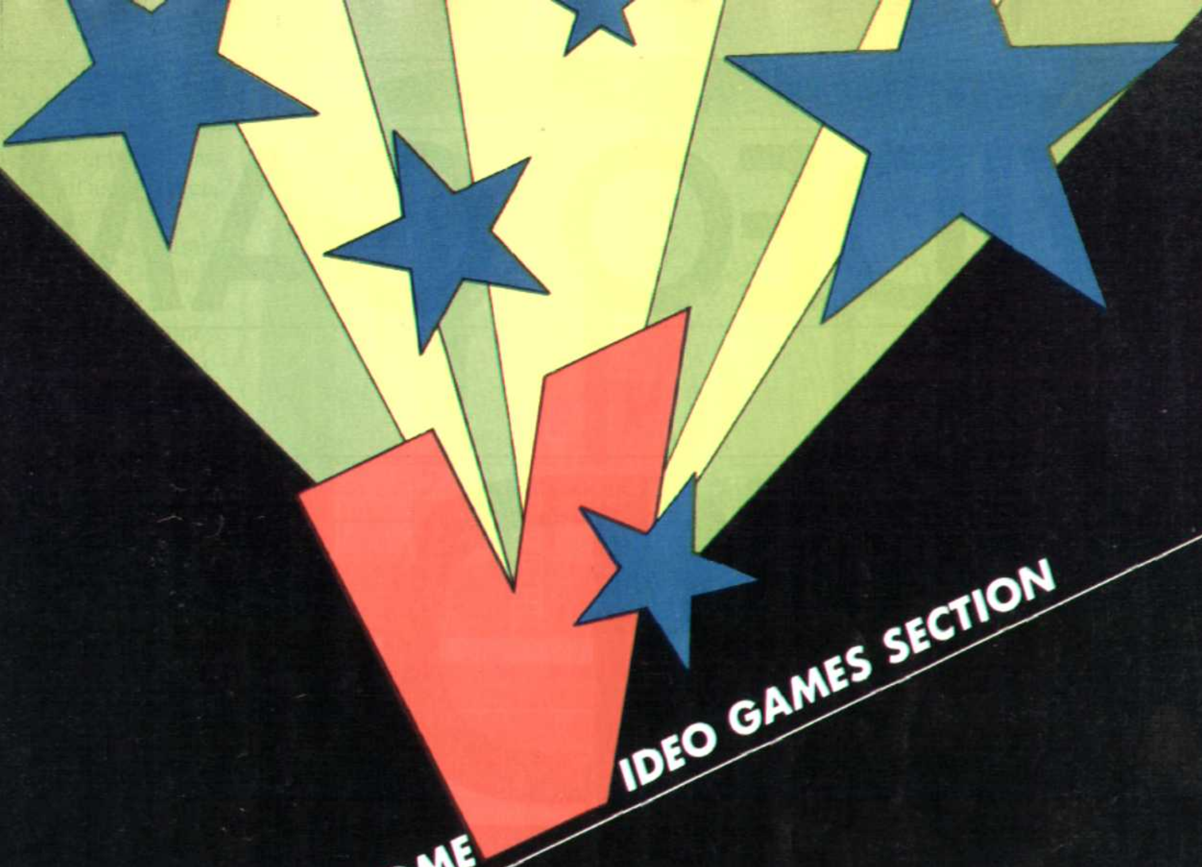
**CBS Video Games**

Are you up to the challenge?

CIRCLE 4 ON READER SERVICE CARD



# HOME VIDEO GAMES SECTION

# VIDEO GAMES UPDATE

**By Danny Goodman**

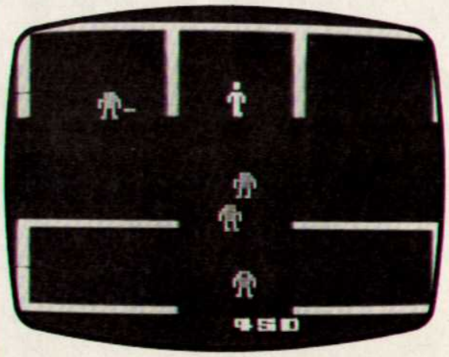
Signs and banners throughout Chicago's McCormick Place on June 6, 1982 proudly announced the Summer Consumer Electronics Show (SCES), a mammoth trade-only exposition of electronic gadgets ranging from $10 digital watches to home audio/video systems pushing $25,000. But this year, most of the 70,000 or so visitors to SCES would agree that the show was incorrectly named. It was really the Summer Video Games Show (SVGS).

Even veteran game industry watchers were having trouble keeping up with all the new hardware and software companies and the designs of dozens of cartridges for the popular Atari VCS and Mattel Intellivision video game systems.

### Pre-Show Warm-Up

As recently as January, it had been easy to get a handle on the industry. Hardware—game console—brands were the same as they had been for a couple of years: Atari, Mattel, Odyssey, and Bally's Professional Arcade under Astrovision's care (their name has since changed, as we'll see).

On the cartridge end, only a few outside companies were on the scene, trying to fill the slots in an estimated 6 million Atari VCS consoles. Activision had started the idea of supplying cartridges as a third party supplier (i.e., cartridges not made by the console manufacturer) in 1980.



Berzerk.

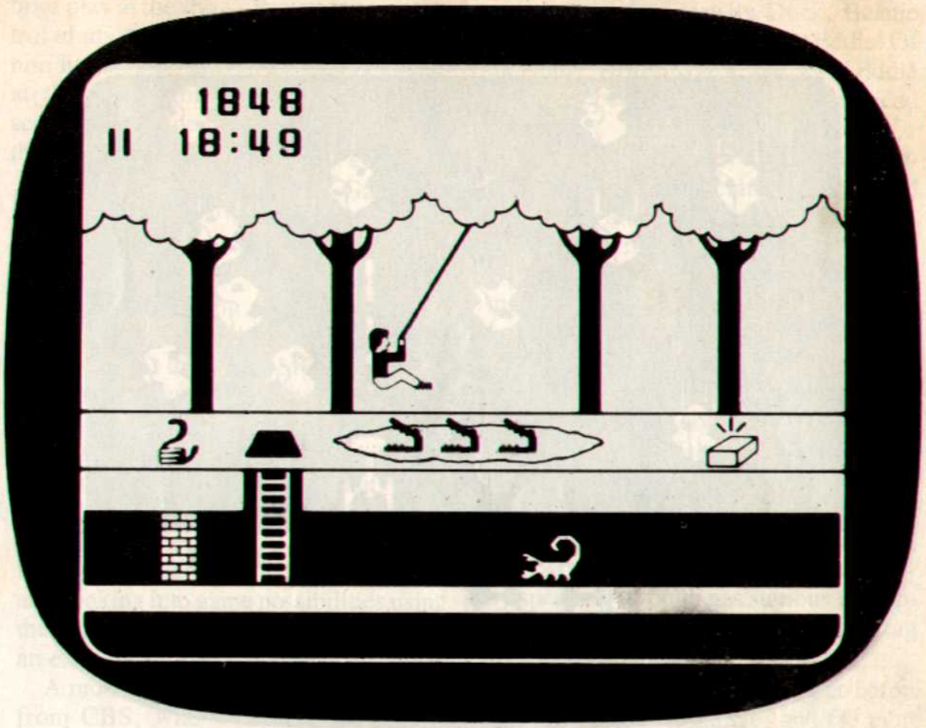
January 1982 saw a few new brands trying to get in on Activision's successful act. Games by Apollo and Imagic demonstrated a total of five Atari-compatible cartridges in various stages of development. And Coleco announced, but did not display, 9 Atari and 11 Intellivision games due later in the year.

Then came the Toy Fair in New York in February, and more action. Parker Bros announced Atari cartridges, as did CBS/Gabriel and even arch-rival Mattel. Coleco did one better: in addition to the cartridges announced earlier, a completely new console system was shown for the first time.

Since then, more new products than you can shake a joystick at have surfaced. The SVGS brought to light prototypes or announcements of about 90 new Atari-compatible games (by my count) from 17 companies, if you include Atari. Lots of new names, too: Arcadia, CommaVid, Data Age, Fox, MCA, Spectravision, Telesys, Tiger and Vidtec.

And then there was a parade of new console systems, like working versions of Atari's new 5200 advanced system and Colecovision. Astrovision renamed both the company and its old Bally system to Astrocade. Entirely new systems by Emerson, Video Technology of Hong Kong, and General Consumer Electronics (GCE), kept show goers busy zapping and beeping.

Now, on to a catalog of details and some first-hand impressions from the



Pitfall Harry's Jungle Adventure.

1982 Summer Video Games Show.

### Atari VCS Action

The company that started the Atari craze was present with several new cartridges for the VCS, as well as with plans for even more in 1983.

Arcade themes on display were limited to previously announced Defender and Berzerk: the first, a wonderful VCS adaptation of one of arcade-dom's most complex and macho favorites; the second, a graphically faithful reproduction that is rather uninteresting in play value.

There was a noticeable emphasis on video adaptations of adventure type games. That's adventure with a small "a"—what I saw bears little resemblance to Atari's popular Adventure cartridge. One series is under the SwordQuest banner, and will be supported by clue-filled comic books designed for each cartridge by DC Comics.

EarthWorld, the first to become available in October, features 12 zodiac rooms with doors containing clues for the hunter. Action sequences are thrown in to add to the difficulty. Experience in EarthWorld is said to prepare you for the second release, FireWorld.

Two more games, AirWorld and WaterWorld, feed on your knowledge of the first two, and are scheduled for 1983. This series will appeal to the dedicated video gamer—or may convert dyed-in-the-wool fantasy role-playing gamers to video games.

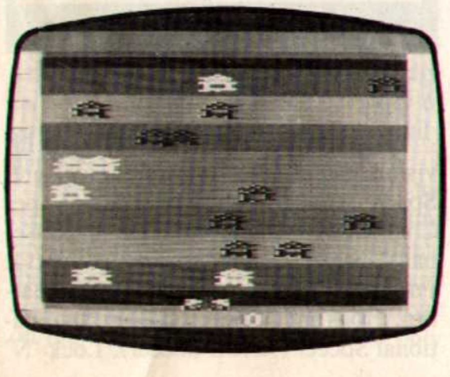
Another adventure style game, due in December, will be based on the movie *Raiders of the Lost Ark.* Atari is promising to pack this cartridge with a new computer coding scheme that crams more graphic detail onto the screen than we have seen before. In this game, we will be guiding Indiana Jones on a treachery-filled trek through 13 rooms to recover the lost ark of the covenant.

Sports fans will see a series of redesigned sports cartridges: Baseball, Volleyball, Football, and Soccer. Only Baseball was on display—or rather, just the screen of the new field and players. It was, indeed, an improvement in graphics over the first generation. Actual game play has yet to be seen, but will surely be a welcome addition for sports-starved VCS players.

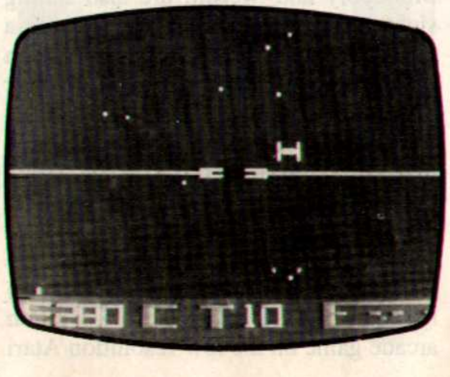
Younger players will probably enjoy a frogs vs. flies game tentatively titled Frog Pond. Two frogs vie for the highest number of flies by jumping and catching the insects with their tongues. If you have seen Intellivision's Frog Bog, you get the picture.

Other Atari-made games introduced included Demons to Diamonds (an average activity that is a cross between Space Invaders and the arcade Centipede on an old Atari Football field), Fail Safe (tank battle) and a VCS version of Atari's outstanding 400/800 computer game, Star Raiders.

Demons to Diamonds.



Star Raiders.



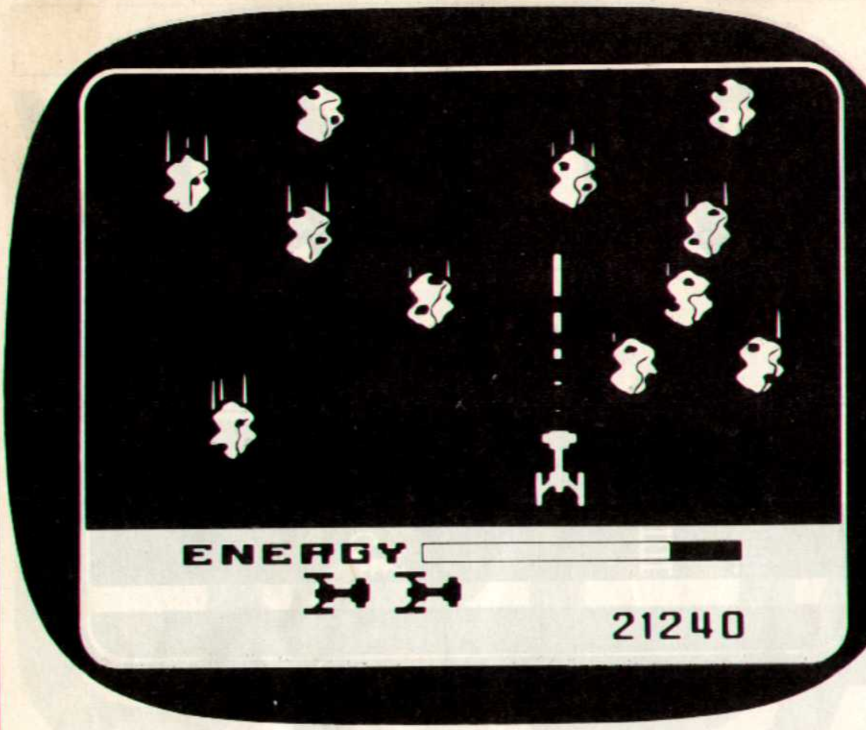
### Activision Activities

I doubt that there is an active VCS owner who doesn't have at least one Activision cartridge in his library—probably Freeway or Kaboom. Well, move over guys—here comes another very original cartridge no VCS should be without: Activision's Pitfall!, subtitled, Pitfall Harry's Jungle Adventure.

Your job is to guide Pitfall Harry through a series of danger scenes (256 different ones, I heard) in search of treasures, while dodging any number of hazards. You need coordination to grab and swing on a vine across tar pits, jump over logs, walk through swamps by carefully stepping on closed-mouth crocodiles . . . and on and on.

Underground passageways may help, until a scorpion or brick wall gets in the way. Graphic detail is startling for the plain ol' VCS, and the play is not something easy to master—the time limit for a search is twenty minutes. Amid all the Atari-compatible cartridge hoopla at the show, this game was a standout.

Activision's other Atari introduction, Megamania, is called a Space Nightmare—but it's more like a Space Invader's Nightmare. Instead of fighting off descending alien creatures, you must shoot at colorful objects like hamburgers, radial tires, dice, irons, bow ties, etc., as they descend to the bottom of the screen. One extra game element is an energy gauge, which runs out if you let too many "invaders" reach ground level.



Megamania.

### Imagic Graphic Magic

Imagic, makers of the graphically well-executed Demon Attack, continued to demonstrate its graphics prowess with four interesting-looking Atari cartridges. On the space front, Atlantis displays a detailed underwater city under attack by various spacecraft.

You start out with three lasers on the screen—one in the center shooting straight up, and one on each side of the screen shooting diagonally across the screen. The joystick selects which laser you want to fire at the spacecraft flying by, and the red action button shoots. Of course, the aliens are not passive: they are trying to bomb your lasers and other Atlantis targets. Reaching high score levels helps replenish your destroyed installations.

Offering more intriguing game play is Imagic's new Cosmic Ark, alternating two-part space encounter. Scene One puts you in charge of the Ark, a large space ship in the center of the screen. Enemies attack from each of four sides. You must respond quickly by moving the joystick in the direction of the on-coming missile and shoot.

Once through a wave, the scene changes to a planet surface. The Ark descends partially. While it hovers, a smaller roving craft disembarks on a time-limited challenge to beam up two of the critters on the planet (Ark, get it?).

At higher levels, this becomes difficult as a deadly ram beam scans over the planet surface seeking aliens such as you. A buzzer sounds, and you must high-tail it back to your mother ship before a meteor comes crashing out of the sky to obliterate your only means of escape. In many ways, this is a turning-of-the-tables on the Defender theme. And it's a winner.

Another Imagic creation features an adventure type game set in the Egyptian Valley of the Kings, called Riddle of the Sphinx. You will need some time to learn how to recognize all the characters and their powers or threats.

Fire Fighter is fun to watch, and will probably delight the kids. The scene is a burning high rise building with a frantic woman running from window to window just out of reach of the inferno. As the firefighter, you put the fire out with your hose and maneuver a hook and ladder to rescue her in the shortest time possible.

### Parker Brothers

Parker Bros, the people who bring you Monopoly and Merlin, are also setting sights on your VCS console slot with a growing series of cartridges based on either popular arcade games or other licensed properties.

The Empire Strikes Back—a game that takes some getting used to before you feel challenged—and a remarkably true-to-arcade Frogger are the first two titles.

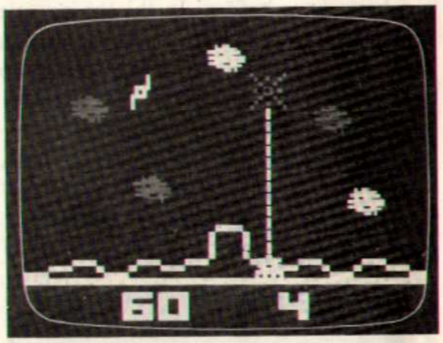
There is always a hazard in trying to reproduce a well-known, high-resolution arcade game on the low-resolution Atari VCS (or any system using a color TV as a display), but Frogger is one of the most detailed translations I have seen. The most noticeable difference in game play is that you have the advantage of a wraparound screen. If Frogger is on a log moving to a screen edge, he will reappear unharmed on the opposite side of the screen.

Announced, but not on display in VCS form, were upcoming Parker cartridges for Amidar (both playfields are planned), Super Cobra, Tutankham, Reactor (this will be a VCS designer's challenge, to be sure), Sky Skipper, and a Spiderman adventure.

### Mattel and Atari

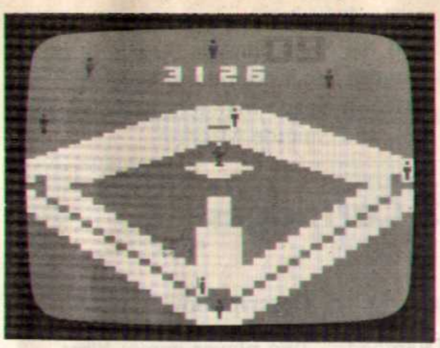
One of the industry surprises this Spring was Mattel's announcement of its intention to produce cartridges for the Atari VCS. At the SVGS, I had an opportunity to see screens of the initial library of eleven games in Mattel's M Network series. All cartridges parallel already successful Intellivision cartridges or ones about to be released. Most of the names are changed on the M Network versions.

For example, Astrosmash is Astroblast for the VCS. Game play is identical. I thought it would be easier using the Atari paddle controllers then the Intellivision direction disk. But, with only a few minutes of play time, I found it not as easy to advance to higher levels—possibly because the falling objects come faster than on the Intellivision version. In any case, this and other Intellivision translations will be welcome library additions for those who were torn between the VCS and the Mattel system and chose the VCS.

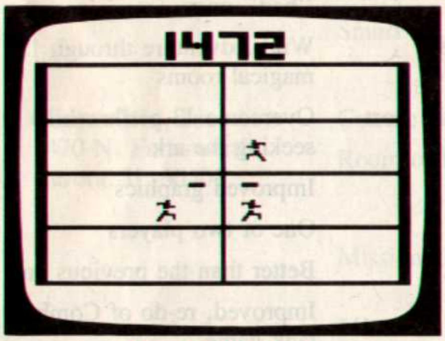


Astroblast.

The remaining cartridges (with Intellivision parent title in parentheses) are: Space Attack (Space Battle), Super Challenge Baseball (Major League Baseball), Super Challenge Football (NFL Football), Armor Ambush (Armor Battle), Frogs and Flies (Frog Bog), International Soccer (NASL Soccer), Lock 'N'



Super Challenge Baseball.



Tron Deadly Discs.

Chase (same), Dark Cavern (Night Stalker), Sea Battle (same), and Tron Deadly Discs (same).

### Games by Apollo

Taking a purely original game design route is Games by Apollo. On display were four new cartridges: Lost Luggage, Racquetball, Shark Attack, and Space Cavern.

Lost Luggage has a cute story line: an airliner lands, and shortly thereafter, luggage starts coming around the baggage claim carousel. But it's running too fast, and luggage goes flying everywhere. You must catch all the pieces before they hit the ground. If one hits, they all open (like Kaboom's bombs going off) with various personal articles, ranging from combs to brassieres, falling to the ground. Each "wave" is a new planeload of luggage.

The graphics are fun to watch, but the game play for experienced players gets old fast. Your screen character, which can move up and down as well as across the screen, has too large an area (about half the screen) to cover for a very random assault of luggage. This cartridge falls into a rapidly growing category of games intended for a broader, family audience.

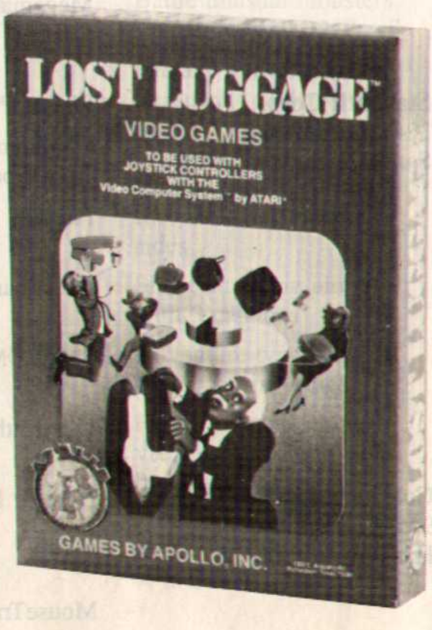
Racquetball takes a difficult-to-reproduce game and makes it almost impossible to play. To help you determine the position of the ball in the enclosed court, you have two ball shadows—one on the floor, one on a wall. From only brief play at the show, I never felt in control of my screen player, as far as getting him lined up to take an automatic swing at the ball. Most of my points were scored by accident. Action games like this should be a little easier to get into.

### The Movies Go To Video Games

In an apparent "can't lick 'em, join 'em" move, three large entertainment companies who had feared erosion of movie and television audiences to video games, launched video game efforts of their own. At the show, MCA (parent of Universal Pictures and Universal Television) simply announced that MCA Video Games Inc. will develop cartridges "in all systems for the home market." We can expect many titles to bear likenesses to action movies and TV shows, but releases won't come until 1983. They are also looking into game possibilities using the capabilities of the laser videodisc—an exciting prospect, indeed.

A more concrete announcement came from CBS, who will issue cartridges through CBS Video Games, a division of CBS's Gabriel Industries (the toy and game maker). In CBS's hip pocket is an arrangement with Bally, whereby CBS will have the video and computer game rights to new Bally arcade games for the next four years. Two Atari-compatible cartridges should be out this year (probably Wizard of Wor and a four-screen version of Gorf), with more cartridges and other game formats to follow in 1983.

If Warner and MCA can do it, so can Twentieth Century Fox, with its new company called Fox Video Games. Four brand-new games developed by veteran computer game creator Sirius Software were on display: Deadly Duck, Beanie Bopper, Worm War I, and Fast Eddie. Of the four, Worm War I and Fast Eddie should appeal most to the experienced gamer.


LOST LUGGAGE™
VIDEO GAMES
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Worm War I, written by former *Creative Computing* Associate Editor David Lubar, is a raucous venture down a dark, vertically scrolling playfield. Colorful side barriers provide a feeling of movement. Waves of worms come into view in images reminiscent of a Star Tek transporter materialization and wriggle like inch worms across the screen, as they scroll toward the bottom of the screen. Worms you don't shoot reappear at the top of the screen in a different color.

The "catch" is that you have limited fuel (displayed as an ever-decreasing number) which can be replenished only by speeding through gas stations that appear at random amid the materializing worms and barriers.

The more momentum you get before going through the garage, and the more accurate your aim through the opening, the more energy you collect. Garages, however, are frequently surrounded by the worms and barriers you are trying to shoot. Errant shots destroy the gas station—and your chance for a recharge on that wave.

Fast Eddie at first looks too cute to be a serious game. Eddie is faced with five floors connected by ladders. On each screen, Eddie must jump to grab nine objects without being touched by creatures, called Sneakers, which vigilantly patrol each floor (you can jump over Sneakers, by pressing your fire button).

Objects appear only two at a time, and replacement objects appear at random forcing Eddie (you) to climb up and down to all levels to pick up enough objects. By the time you grab the ninth object (the points for each successive object flash for a second where the object originally appeared on the screen), the one Sneaker, called High Top, who guards the top floor, is short enough to jump over.

Get your Fast Eddie up to the top floor, successfully jump over High Top, touch the key he carries, and you are on to the next difficulty level. Each of the eight progressively difficult levels (featuring more and/or larger Sneakers making jumping a trick) contains five or six screens—providing a lot of play time for the experienced player.

### Improved VCS Graphics

If I had not seen it with my own eyes, I would not have believed that the Atari VCS could be "supercharged" with a plug-in device to increase graphic resolution. But Starpath Corp. sure seems to have done it. Moreover, the games are contained on low-cost audio cassettes, loaded through a tape player.

Starpath's Supercharger ($69.95, including one cassette) looks like an extra-long game cartridge that plugs into the slot on the VCS console. A wire coming from the Supercharger case goes to the earphone jack of a cassette player. Taped programs ($14.95 each) load into the expanded RAM of the supercharger (6272 bytes vs. 128 bytes in the VCS) just like a microcomputer program.

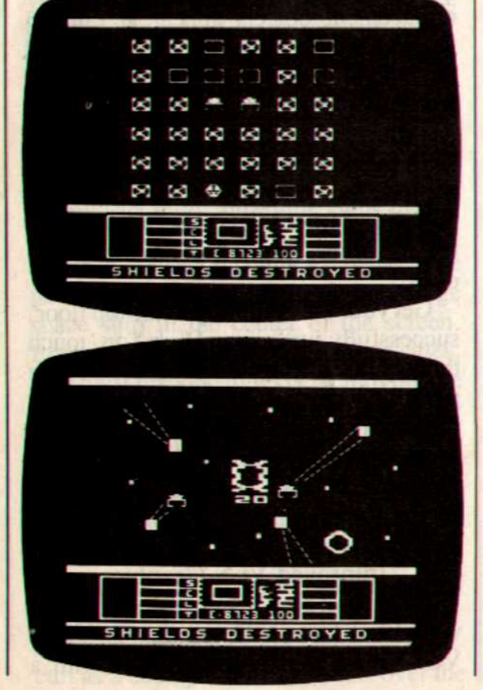
The additional RAM enlarges the amount of screen/graphics information that can be stored (or "dumped," if you will) onto the TV tube. It allows, in the end, the graphics generator to scan every line of the TV screen, instead of repeating an image for two lines, as the VCS does by itself. The balance of the RAM is left for program instructions which normally come from the plug-in ROM cartridges.

The graphics are something else. On one tape, Phaser Patrol, you are in a Star Raiders/Starmaster environment, with two screens of action: a galactic sector map and a cockpit action screen. But it is the detail of the instrument panel that shows how much improved the resolution is. Small letters and numerals are easily readable, and a fascinating clock has very small, yet distinct elements.

I also saw some scenes from a maze game that was still under development. The view was that of walking down corridors. Diagonal lines receding into the distance were among the smoothest (i.e., little noticeable "stair-stepping") I have seen on any home video game system.

The Phaser Patrol cassette is shipped with the Supercharger. Other titles announced are Communist Mutants From Space (a Space Invaders variant), Fireball, and Suicide Mission.

**Phaser Patrol.**



## New Atari VCS Cartridges

| Manufacturer | Game Name | Description |
|---|---|---|
| **Atari Inc.**<br>1265 Borregas Ave.<br>Sunnyvale, CA 94086 | Demons to Diamonds | Two-player game; blast "good" demons, avoid "bad" ones |
| | Earth World | Wild Adventure through 12 magical rooms |
| | Raiders of the Lost Ark | Overcome 13 perils while seeking the ark |
| | Baseball | Improved graphics |
| | Volleyball | One or two players |
| | Football | Better than the previous one |
| | Fail Safe | Improved, re-do of Combat tank game |
| | Frog Pond | Frog tongue zaps flies |
| | Defender | Blast aliens with lasers and smart bombs, save humanoids |
| | Berzerk | Dodge through maze with nasty robots |
| | Math Gran Prix | Two-player game teaches math |
| **Activision Inc.**<br>2350 Bayshore Frontage Rd.<br>Mountain View, CA 94043 | Star Master | Space battle in genre of Star Raiders |
| | Chopper Command | Helicopter gunship moves 4 ways. Like Defender |
| | Pitfall! | Avoid jungle obstacles |
| | Megamania | Outlandish objects rain down from above |
| **Starpath Corp.**<br>324 Martin Ave.<br>Santa Clara, CA 95050 | Phaser Patrol | Space battle a la Star Raiders |
| | Communist Mutants from Space | Meanies rain down from Galaxian-type formations |
| | Fireball | Breakout with unusual shaped walls |
| | Excalibar | Adventure-type game with a birds-eye view |
| | Suicide Mission | Blast bacteria in blood vessels |
| | Labyrinth | Multi-dimensional maze |
| **Coleco Industries Inc.**<br>945 Asylum Ave.<br>Hartford, CT 06105 | Donkey Kong | Mario against Kong |
| | Venture | Adventure-type game with a birds-eye view |
| | MouseTrap | Avoid the cats in the maze |

| Manufacturer | Game Name | Description |
|---|---|---|
| Coleco, *continued* | Cosmic Avenger | Combination of Galaxian and Space Invaders |
| | Lady Bag | Maze with rotating turnstiles |
| | Carnival | Shoot 3 rows of moving targets |
| | Turbo | High-speed auto race |
| | Zaxxon | 3-D perspective flight of fighter |
| | Smurf | Fantasy with the blue furries |
| **CommaVid, Inc.**<br>1470 N. Farnsworth<br>Aurora, IL 60505 | Cosmic Swarm | Invade the termites' nest |
| | Room of Doom | You're trapped with meanies shooting through panels that open and close |
| | Mission Omega | Dodge obstacles and shoot interceptors |
| | Mines of Minos | Assemble robots and avoid aliens in a mine maze |
| **Data Age Video Games**<br>14583 Big Basic Way<br>Saratoga, CA 95070 | Warp Lock | Fierce space battle |
| | SSSnake! | Shoot the snakes—but they split in two! |
| | Survival Run | Grab cubes in a labyrinth |
| | Encounter at L-5 | Yet another space battle |
| | Airlock | Adventure-type game in a sinking submarine |
| **Games by Apollo**<br>1300 East Arapaho<br>Richardson, TX 75081 | Racquetball | 3-D realism, 1 or 2 player |
| | Lost Luggage | Catch suitcases from out-of-control baggage carousel |
| | Space Cavern | Battle unusual monsters from sides and overhead |
| | Shark Attack | Fantasy hunt for sunken treasure in underwater maze |
| **Imagic Corporation**<br>20665 Fourth St.<br>Saratoga, CA 95070 | Cosmic Ark | Guide space ark through foes attacking from all sides |
| | Atlantis | Shoot attacking aircraft with 3 cannons |
| | Riddle of the Sphinx | Adventure-type game in Valley of the Kings |
| | Fire Fighter | Fight fires and rescue victims in burning buildings |
| **Mattel Electronics**<br>5150 Rosecrans Ave.<br>Hawthorne, CA 90250 | Astroblast | Nasties attack from above |
| | Space Attack | A la Star Raiders |

COLECO DONKEY KONG
COLECO ZAXXON
COLECO VENTURE
COLECO SMURF
COLECO TURBO
COLECO AVENGER
COLECO MOUSE TRAP
COLECO LADY BUG
COLECO carnival

Coleco Cartridges.

### Coleco Cartridge Collection

At the heavily guarded Coleco booth, only one of the company's nine Atari-compatible cartridges was on display—and a very interesting display at that.

Set up side by side were Coleco's three versions of the same game, Donkey Kong—in Atari cartridge, Intellivision cartridge, and Colecovision cartridge forms. Although I probably could have spent an hour comparing the three, my initial reaction is that the Colecovision takes the top prize in arcade realism (see Colecovision report below), followed surprisingly by the Atari and Intellivision, in that order. In this case, arcade realism is judged not in terms of graphic resolution, where, of course, Intellivision beats the VCS by a mile, but in terms of pleasing reproduction. Looking at the two screens, the VCS was more inviting. If Coleco does as well with the other VCS cartridges (Venture, Cosmic Avenger, Mouse Trap, Lady Bug, Carnival, Smurf, Zaxxon, and Turbo), there could be some tough decisions to make at the cartridge counter.

### New Kids On The Block

All sorts of new company names surfaced on the Atari-compatible front.

Vidtec is a new brand offered by U.S. Games Corporation, which is a newly acquired subsidiary of the Quaker Oats

Company. Got that? If not, don't worry. Vidtec is the name that will appear on the cartridges. The announced opening library is a collection of eight varied titles, practically all dedicated to family play, rather than ultra-macho themes.

Two are intended for the very young. Sneak n' Peek is a video hide-and-seek with interesting cartoon graphics of rooms inside a mansion. Word Zapper is a clever educational game that combines a memory/spelling drill with a shoot-'em-up arcade game.

No manufacturer's library can be without a space game, and Vidtec's is Space Jockey, previewed at the January Consumer Electronics show. In this one, you are the space ship, fending off helicopters, balloons, planes, and ground tanks scrolling at you horizontally across the screen.

Commando Raid is another shot-'em-up, with parachuting commandos trying to land and capture your ground gun. Weird Bird is a Kaboom variation, in which you must catch falling eggs before they splat. But you also have a chance to shoot at the birds.

Other Vidtec titles include Towering Inferno, Gopher Attack (they could have used this game and its Gopher Bonker in the movie *Caddyshack)* and Maze Chase.

### A Tiger In Your VCS

A fast-paced maze game called Jawbreakers (licensed from On-Line Systems) is one of five titles introduced by Tiger Electronic Toys' new Tigervision line of cartridges. You may have seen Apple and Atari computer versions of this game, but the VCS version is much different. In this one you control candy-bar-eating teeth (like the wind-up clattering novelty) up, down, and across a series of fast-moving horizontal lanes. Occasional breaks in the lanes let you jump from one to the next as you try to avoid smiling faces (like Berzerk's Evil Otto) that race down the lanes after you. When you clear the screen of candy bars, you pause while a colorful toothbrush comes out to keep you cavity-free.

The balance of the library includes King Kong (licensed from the movie, and reminiscent of Donkey Kong in play), River Patrol, Marauder (robots in a maze) and Threshold (a space fight game).

### Command CommaVid

CommaVid is another new name on the cartridge scene, presenting four new games for the VCS: Cosmic Swarm, Room of Doom, Mission Omega and Mines of Minos.

Cosmic Swarm is an appealing game because there are several things going on at once—a combination of strategy and shoot-'em-up skill is needed. The instructions relate an overly detailed and unnecessarily confusing scenario for the game, in which "metal-munching termites" crawl out from the top of the screen at random, each carrying a square block. They lay these blocks at random around the play area.

You are in command of a small space

| **Manufacturer** | **Game Name** | **Description** |
|---|---|---|
| **Mattel,** *continued* | Super Challenge Baseball | Perspective of ballfield |
| | Super Challenge Football | 180 possible plays |
| | Armor Ambush | Maneuver through enemy terrain |
| | Frogs and Flies | Leap off lily pad to catch flies |
| | International Soccer | 3-D perspective of field |
| | Lock 'N' Chase | 1 or 2 player maze game |
| | Dark Cavern | Robots, bats and spiders in this maze |
| | Tron Deadly Disks | Escape richocheting deadly discs; throw your own |
| | Sea Battle | Lead a flotilla of ships in battle |
| **MCA Video Games**<br>100 Universal City Plaza<br>Universal City, CA 91608 | No Games Announced | |
| **Parker Brothers**<br>50 Dunham Road<br>Beverly, MA 01915 | The Empire Strikes Back | Attack the plodding Imperial Walkers |
| | Frogger | Cross a highway and river |
| | Amidar | Close in rectangles on large grid |
| | Spiderman | Adventure-type game |
| | Reactor | Blast the control rods in a reactor core nearing meltdown |
| | Super Cobra | Command a helicopter gunship |
| | Sky Skipper | Attack giant gorillas and save a royal family |
| | Tutankham | Adventure in a tomb |
| | James Bond Agent 007 | World-wide adventure |
| **Spectravision**<br>39 W. 37th St.<br>New York, NY 10018 | Gangster Alley | Shoot gangsters who appear in building windows |
| | Planet Patrol | Dodge missiles and shoot nasties in a day and night mission |
| | Cross Fire | For 2 players: catch nasties in your crossfire |
| | Tape Worm | Tough variation of blockade |
| | China Syndrome | Recover radioactive particles |

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| Supersort | 17.86 |
| T: (Text Display) | 17.86 |
| Text Editor | 31.86 |
| Ultimate Renumber | 17.86 |
| Utility Disk | 38.86 |
| Word Processor | 38.86 |

## Super Atari 5200

| | |
|---|---|
| **Master Component** | 199.86 |

## Adult Video Games

Fits Atari

YOU MUST BE 21

| | |
|---|---|
| Bachelor Party | 41.86 |
| Beat 'Em & Eat 'Em | 41.86 |
| Custer's Revenge | 41.86 |

## Tandy/Radio Shack

### Computers and Accessories

| | |
|---|---|
| **Color Computer with 16K expansion** | 343.86 |
| Color Computer | 263.86 |
| Line Printer I | 324.86 |
| Mini-Disc Drive | 487.86 |
| Cassette Recorder | 48.86 |
| Telephone Modem I | 121.86 |
| Joysticks, each | 10.86 |
| 9½-in. paper (500 sheets) | 6.86 |
| Ribbon for Printer | 7.86 |
| Diskettes, each | 3.86 |
| Dust Cover | 4.86 |
| Cassette Tapes, each | 3.86 |
| Printer Cables | 4.86 |

### Software

| | |
|---|---|
| Super Bustout | 24.86 |
| Space Assault | 24.86 |
| Project Nebula | 32.86 |
| Polaris | 24.86 |
| Micropainter | 32.86 |
| Microbes | 24.86 |
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| Videotex | 24.86 |
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## Odyssey

| | |
|---|---|
| **Master Component** | 129.86 |
| Voice Module | 72.86 |
| Sid the Spellbinder (Voice) | 43.86 |
| Numbers and Nimble Ned (Voice) | 43.86 |
| Type and Tell (Voice) | 33.86 |
| K.C.'s Crazy Chase (Voice) | 30.86 |
| Smithereens (Voice) (Nov.) | 30.86 |
| Acrobat (Voice) (Nov.) | 30.86 |
| Creature (Voice) (Nov.) | 30.86 |
| Arcade (Voice) (Nov.) | 30.86 |
| Las Vegas Blackjack | 19.86 |
| Football | 19.86 |
| Armored Encounter/Sub Chase | 19.86 |
| Bowling/Basketball | 19.86 |
| Math-A-Magic/Echo | 19.86 |
| Computer Intro | 33.86 |
| Match/Logix/Buzzword | 19.86 |
| Baseball | 19.86 |
| Computer Golf | 19.86 |
| Cosmic Conflict | 19.86 |
| Take the Money & Run | 14.86 |
| I've Got Your Number | 14.86 |
| Invaders from Hyperspace | 19.86 |
| Thunderball | 19.86 |
| Showdown in 2100 A.D. | 19.86 |
| War of Nerves | 19.86 |
| Alpine Skiing | 19.86 |
| Helicopter Rescue/Out of This World | 19.86 |
| Hockey/Soccer | 19.86 |
| Dynasty | 14.86 |
| Volleyball | 19.86 |
| Foosball | 14.86 |
| Pocket Billiards | 19.86 |
| Pachinko | 19.86 |
| Slot Machine | 19.86 |
| Blockout/Breakdown | 19.86 |
| Alien Invaders | 19.86 |
| Quest for the Rings | 43.86 |
| UFO | 27.86 |
| Conquest of the World | 43.86 |
| Monkeyshines | 27.86 |
| Keyboard Creations | 19.86 |
| Great Wall Street Fortune Hunt | 43.86 |
| TV/Game Switch | 14.95 |
| Pickaxe Pete | 29.86 |
| Freedom Fighter | 29.86 |

## Mattel

| | |
|---|---|
| **Master Component** | 169.86* |
| *after rebate (you send 219.86) | |
| Auto Racing | 28.86 |
| NHL Hockey | 23.86 |
| Las Vegas Roulette | 14.86 |
| ABPA Backgammon | 19.86 |
| Checkers | 14.86 |
| Tank Battle | 28.86 |
| Electric Co. Word Fun | 14.86 |
| Horse Racing | 23.86 |
| Tennis | 23.86 |
| P.G.A. Golf | 23.86 |
| U.S. Ski Team Skiing | 28.86 |
| Sea Battle | 31.86 |
| Boxing | 28.86 |
| Dungeons & Dragons | 44.86 |
| NFL Football | 28.86 |
| Space Battle | 28.86 |
| Electric Co. Math Fun | 14.86 |
| NBA Basketball | 28.86 |
| Intellivoice | 74.86 |
| PBA Bowling | 28.86 |
| Sub-Hunt | 28.86 |
| Chess | 46.86 |
| Space Spartans | 37.86 |
| Astro Smash | 28.86 |
| Snafu | 28.86 |
| Space Armada | 28.86 |
| Triple Action | 23.86 |
| Bomb Squad (Aug.) | 37.86 |
| B-17 (Aug.) | 37.86 |
| Space Hawk | 31.86 |
| Utopia | 31.86 |
| Star Strike | 31.86 |
| Speed Freak | 28.86 |
| Minotaur (1983) | 37.86 |
| Frog Bog | 19.86 |
| Land Battle (1983) | 37.86 |
| Royal Dealer (Oct.) | 19.86 |
| Reversi | 19.86 |
| Night Stalker | 31.86 |
| Pin Ball (1983) | 23.86 |
| Tron-Deadly Disc | 28.86 |
| Tron-Mazatron | 28.86 |
| Tron-Solar Sailor | 37.86 |
| Armor Battle | 28.86 |
| Lock 'n' Chase | 31.86 |
| International Soccer | 28.86 |
| Las Vegas Poker & Black Jack | 14.86 |
| Major League Baseball | 28.86 |
| Roulette | 28.86 |

### Handhelds

| | |
|---|---|
| Dungeons and Dragons | 23.86 |
| Armor Attack | 33.86 |
| Space Battle | 33.86 |
| Formula Racer | 33.86 |
| Long Bomb Football | 28.86 |
| Competition Football | 20.86 |
| World Champ. Football | 62.86 |
| World Champ. Baseball | 62.86 |
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| Computer Backgammon | 74.86 |
| Synsonics Drums | 118.86 |
| Diet Trac | 53.86 |
| Basketball 2 (Dec.) | 35.86 |
| Star Hawk | 28.86 |
| Speed Freak | 28.86 |
| Computer Chess | 28.86 |

## Network

Made by Mattel to fit Atari games.

| | |
|---|---|
| Pro Football | 29.86 |
| Space Attack | 29.86 |
| Armor Ambush | 29.86 |
| Tron-Deadly Discs | 34.86 |
| Lock n' Chase | 34.86 |
| Frogs & Flies | 24.86 |
| ~~Big League Baseball~~ | 29.86 |
| Astroblast | 29.86 |
| ~~Dark Cavern~~ | 34.86 |
| International Soccer | 29.86 |
| Mattel Soft Dust Cover | 9.86 |
| Tank Battle | 28.86 |

## Activision

Fits Atari

| | |
|---|---|
| ~~Dragster~~ | 18.86 |
| Boxing | 18.86 |
| ~~Checkers~~ | 18.86 |
| Pitfall | 24.86 |
| Magamania | 24.86 |
| ~~Fishing Derby~~ | 18.86 |
| ~~Skiing~~ | 18.86 |
| ~~Bridge~~ | 24.86 |
| ~~Tennis~~ | 18.86 |
| Laser Blast | 18.86 |
| ~~Freeway~~ | 18.86 |
| Kaboom | 18.86 |
| ~~Stampede~~ | 18.86 |
| Ice Hockey | 24.86 |
| ~~Barnstorming~~ | 24.86 |
| ~~Grand Prix~~ | 24.86 |
| Chopper Command | 24.86 |
| ~~Starmaster~~ | 24.86 |

## Activision

Fits Mattel

| | |
|---|---|
| Pitfall (Dec.) | 24.86 |
| Stampede (Dec.) | 24.86 |

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## Parker Bros.

Fits Atari

| | |
|---|---|
| Star Wars | 29.86 |
| Jaws (Jan. '83) | 29.86 |
| James Bond 007 (Jan.) | 29.86 |
| Frogger | 29.86 |
| Amidar (Oct.) | 29.86 |
| Super Cobra (Oct.) | 29.86 |
| Reactor (Oct.) | 29.86 |
| Tutankham (1983) | 29.86 |
| Sky Skipper (Jan. '83) | 29.86 |
| Spiderman (Oct.) | 29.86 |
| Revenge of the Jedi (1983) | 29.86 |

## Astrocade

| | |
|---|---|
| **Master Component** (Includes 4 built-in games.) | 239.86 |
| Hand Controls (ea.) | 27.86 |
| ZZZZZap/Dodgem | 21.86 |
| Seawolf/Missile | 21.86 |
| Red Baron | 18.86 |
| Clowns/Brickyard | 25.86 |
| Star Battle | 21.86 |
| Astro Battle | 25.86 |
| Dog Patch | 25.86 |
| Galactic Invasion | 25.86 |
| Space Fortress | 25.86 |
| Grand Prix | 25.86 |
| Pirate Chase | 25.86 |
| Munchie (1983) | 28.86 |
| The Wizard (1983) | 28.86 |
| Solar Conqueror | 28.86 |
| Cosmic Raiders/Defenders | 28.86 |
| Bezbol/Tennis/Hockey/Handball | 25.86 |
| Football | 25.86 |
| Pinball | 25.86 |
| Bingo Math | 18.86 |
| Letter Match/Spell 'n' Score/Crosswords | 25.86 |
| Music Maker I | 47.86 |
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| Coloring book | 28.86 |
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| Quest for the Orb | 28.86 |
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| Toronado Baseball | 18.86 |
| Tic-Tac-Toe | 18.86 |
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## Astrocade Computers

| | |
|---|---|
| **ZGrass Computer** | 479.86 |
| Bally Basic | 47.86 |

## Vectrex

| | |
|---|---|
| **Master Component** | 188.86 |
| Controller | 32.86 |
| Scramble | 28.86 |
| ~~Star Trek~~ | 28.86 |
| ~~Solar Quest~~ | 28.86 |
| ~~Space Wars~~ | 28.86 |
| Rip Off | 28.86 |
| ~~Star Hawk~~ | 28.86 |
| Cosmic Chasm | 28.86 |
| Armor Attack | 28.86 |
| Berzerk | 28.86 |
| ~~Clean Sweep~~ | 28.86 |
| ~~Blitz Football~~ | 28.86 |
| ~~Auto Race~~ | 28.86 |

## Game Mate 2

Fits Atari 2600 and Commodore VIC-20

| | |
|---|---|
| Wireless Remote | t.b.a. |

## Arcadia

| | |
|---|---|
| Super Charger | 59.86 |
| Communist Mutants from Outer Space | 13.86 |
| Fireball | 13.86 |
| Suicide Mission | 13.86 |

## Wizard Video

Fits Atari

| | |
|---|---|
| Flash Gordon (X Rated) | t.b.a. |
| Texas Chainsaw Massacre | t.b.a. |

## Ultravision

Fits Atari

| | |
|---|---|
| Condor Attack | t.b.a. |
| Karate | t.b.a. |

## Colecovision

Fits Coleco

| | |
|---|---|
| **Master Component** | 199.86 |
| Wizard of War (Feb.) | 30.86 |
| Gorf (Feb.) | 30.86 |
| Space Panic (Feb.) | 30.86 |
| Controller | 24.86 |
| Spectar (Mar.) | 24.86 |
| Rip Cord | 24.86 |
| Side Trak | 24.86 |
| Dimensional Puzzle | 24.86 |
| Challenger Chess | 24.86 |
| 005 | 24.86 |
| Victory | 30.86 |
| Head to Head Football | 30.86 |
| Head to Head Baseball | 30.86 |
| Conversion Module (for Atari Cartridges) | 69.86 |
| Donkey Kong | 30.86 |
| Turbo | 69.86 |
| Space Fury | 30.86 |
| Venture | 30.86 |
| Mouse Trap | 30.86 |
| Lady Bug | 30.86 |
| Cosmic Avenger | 30.86 |
| Zaxxon | 49.86 |
| Las Vegas | 30.86 |
| Horse Racing | 30.86 |
| Smurf Action | 30.86 |
| Carnival | 30.86 |
| Tunnels & Trolls (Dec.) | 30.86 |
| Skiing | 30.86 |
| Chess | 30.86 |
| Smurf 2 | 30.86 |
| Mr. Turtle | 30.86 |
| Expansion #2 | 30.86 |

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| | |
|---|---|
| Donkey Kong | 59.86 |
| Galaxian | 59.86 |
| Frogger | 59.86 |
| Pac-Man | 59.86 |
| Perma Power | 9.86 |

## Coleco

Fits Atari

| | |
|---|---|
| Donkey Kong | 30.86 |
| Zaxxon (Oct.) | 49.86 |
| Turbo (Sept.) | 69.86 |
| Venture | 30.86 |
| Mouse Trap | 30.86 |
| Smurf | 30.86 |
| Carnival | 30.86 |
| Lady Bug | 30.86 |

## Coleco

Fits Mattel

| | |
|---|---|
| Donkey Kong | 32.86 |
| Turbo (Oct.) | 69.86 |
| Mouse Trap | 32.86 |
| Zaxxon (Nov.) | 49.86 |
| Carnival | 32.86 |
| Venture | 32.86 |
| Smurf | 32.86 |
| Lady Bug | 32.86 |

## U.S. Games

(Vidtec) Fits Atari

| | |
|---|---|
| Weird Bird (Jan.) | 22.86 |
| Squeeze Box (Oct.) | 22.86 |
| Guard. of Treasure (Nov.) | 22.86 |
| Towering Inferno (Nov.) | 22.86 |
| Gopher Attack (Dec.) | 22.86 |
| Maze Chase (Oct.) | 22.86 |
| Space Jockey | 18.86 |
| Sneek & Peek | 22.86 |
| Word Zapper | 22.86 |
| Commando Raid | 22.86 |
| Missile Intercept (Aug.) | 22.86 |
| Catch (Aug.) | 22.86 |
| The Fly (Sept.) | 22.86 |
| Darts (Sept.) | 22.86 |

## Spectravision

Fits Atari

| | |
|---|---|
| Gangster Alley | 21.86 |
| Planet Patrol | 21.86 |
| Cross Fire | 21.86 |
| Tape Worm | 21.86 |
| China Syndrome | 21.86 |

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|---|---|
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| *after rebate (you send 319.86) | |
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| Joysticks | 34.86 |
| Speech Synthesizer | 124.86* |
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| Memory Expansion Card | 249.86 |
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| Add & Subtract 1 | 33.86 |
| Add & Subtract 2 | 33.86 |
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| Video Chess | 58.86 |
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| TI Logo | 83.86 |
| Reading Fun | 45.86 |

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| | |
|---|---|
| Football | 25.86 |
| Indoor Soccer | 25.86 |
| A-Maze-ing | 21.86 |
| Tombstone | 33.86 |
| TI Invaders | 33.86 |
| Car Wars | 33.86 |
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### Other Programs

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|---|---|
| Statistics | 37.86 |
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## Emerson Arcadia 2001

| | |
|---|---|
| **Master Component** | 88.86 |
| Cat Trax | 23.86 |
| Space Attack | 23.86 |
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| Funky Fish | 23.86 |
| Space Raiders | 23.86 |
| Brain Quiz | 12.86 |
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| Space Mission | 17.86 |
| Missile War | 17.86 |
| Ocean Battle | 17.86 |
| Red Clash | 23.86 |
| 3D Bowling | 17.86 |
| American Football | 23.86 |
| Baseball | 17.86 |
| Soccer | 17.86 |
| Breakaway | 23.86 |
| Star Chess | 17.86 |
| Capture | 12.86 |
| Tanks a Lot | 23.86 |
| Grand Slam Tennis | 23.86 |
| Pleiades | 23.86 |
| Jungler | 23.86 |
| Spiders | 23.86 |

## Gamestar

Fits Atari 400/800 Computers

| | |
|---|---|
| Baja Buggies | t.b.a. |

## Data Age

Fits Atari

| | |
|---|---|
| Encounter at L-5 | 27.86 |
| Warplock | 27.86 |
| Sssnake | 27.86 |
| Airlock | 27.86 |
| Survival Run | 27.86 |
| Bugs | 27.86 |
| Video Command Joystick | 19.86 |

## Apollo

Fits Atari

| | |
|---|---|
| Skeet Shoot | 18.86 |
| Space Chase | 24.86 |
| Space Cavern | 24.86 |
| Racketball | 24.86 |
| Lost Luggage | 24.86 |
| Shark Attack | 24.86 |
| Infiltrate | 24.86 |
| Kyphus | 24.86 |
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| Pompeii | 24.86 |
| Squoosh | 24.86 |

## Apollo

Fits Mattel

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## Commodore VIC 20 Computers

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|---|---|
| **The Friendly Computer** | 199.86 |
| Commodore Datasette | 73.86 |
| Single Disk Drive | 375.86 |
| Graphic Printer | 381.86 |
| VICMODEM (Telephone Interface) | 106.86 |
| VIC 3K Memory Expander Cartridge | 37.86 |
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| VIC 16K Memory Expander Cartridge | 106.86 |
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| Recreation Program Pk. | 56.86 |
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| VIC Printer Ribbon Cart. | 8.86 |

## Imagic

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|---|---|
| ~~Trick Shot~~ | 18.86 |
| Demon Attack | 23.86 |
| ~~Star Voyager~~ | 23.86 |
| Atlantis | 23.86 |
| Cosmic Ark | 23.86 |
| Fire Fighter | 18.86 |
| Riddle of the Sphinx | 23.86 |
| Video Action Center | 31.95 |

## Imagic

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| | |
|---|---|
| Demon Attack (Oct.) | 29.86 |
| Atlantis (Oct.) | 29.86 |
| Swords & Sorcerers (Oct.) | 29.86 |
| Micro Surgeon (Nov.) | 31.86 |
| Beauty and the Beast (Nov.) | 31.86 |
| Big Bully (Dec.) | 31.86 |

## 20th Century Fox

Fits Atari

| | |
|---|---|
| Worm War I | 23.86 |
| Beenie Bopper | 23.86 |
| Fast Eddie | 19.86 |
| Deadly Duck | 19.86 |
| Alien | 23.86 |
| Turmoil | 23.86 |
| Megaforce | 23.86 |

## Epyx

Fits TRS-80 16K (Cassettes)

| | |
|---|---|
| Invasion Orion | 22.86 |
| Temple of Apshai | 34.86 |
| Hellfire Warrior | 34.86 |
| Upper Reaches of Apshai | 17.86 |
| The Keys of Acheron | 17.86 |
| Curse of Ra | 17.86 |
| Danger in Drindisti | 17.86 |
| Datestones of Ryn | 17.86 |
| Morlocs Tower | 17.86 |
| Sorcerer of Siva | 24.86 |
| Rescue at Riegel | 24.86 |
| Star Warrior | 34.86 |
| Crush, Crumble & Chomp | 24.86 |
| Richochet | 17.86 |
| Monster Maze | 24.86 |
| New World | 24.86 |

## Syncro

Fits Atari 400/800 Computers

| | |
|---|---|
| Maze of Death | t.b.a. |
| Mar Tesoro | t.b.a. |
| Drac is Back | t.b.a. |
| Alien Hell | t.b.a. |
| Wordmania | t.b.a. |
| Astron IV | t.b.a. |
| Laser Ants (Feb.) | t.b.a. |
| Astron IX (Feb.) | t.b.a. |

## Comma Vid

Fits Atari

| | |
|---|---|
| Cosmic Swarm | 28.86 |
| Room of Doom | 28.86 |
| Mines of Minos | 28.86 |
| Mission Omega | 28.86 |
| Underworld | 28.86 |

## Tigervision

Fits Atari

| | |
|---|---|
| King Kong | 23.86 |
| Jaw Breakers | 23.86 |
| Treshold (Sept.) | 18.86 |
| River Patrol (Aug.) | 18.86 |
| Marauder (Oct.) | 18.86 |

## Thorn/EMI

Fits Atari 400/800 Computers

| | |
|---|---|
| Cube Puzzle | t.b.a. |
| Submarine Commander | t.b.a. |

## Telesys

Fits Atari

| | |
|---|---|
| Cosmic Creeps | t.b.a. |
| Fast Food | t.b.a. |
| Coconuts | t.b.a. |

## First Star

Fits Atari 400/800 Computers

| | |
|---|---|
| Astrochase (32K) | 27.86 |

## Discwasher

Fits Atari and Commodore

| | |
|---|---|
| Pointmaster Joystick | 24.86 |

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**CIRCLE 18 ON READER SERVICE CARD**

fighter (with Asteroids-like rotation and thrust movement, but no hyperspace) charged with keeping the play area clear. To do this, you must hit a block in a very precise spot, while a termite is still carrying it. All the blocks on the playfield then turn from green to red. While they are red (energized), your laser can destroy them one-by-one. But if a termite should start after you (and it will!), you may be forced to shoot it in self-defense, which will cause all blocks to turn back to the impenetrable green.

As soon as you think you have everything under control, you hear a buzzer that warns that you need to refuel by docking briefly with a fuel ship which appears along either the left or right screen edge. This gives the termites time to lay more blocks.

| Manufacturer | Game Name | Description |
|---|---|---|
| **Telesys**<br>43334 Bryant St.<br>Fremont, CA 94539 | Fast foods | Catch flying foods; avoid the purple pickle |
| | Coco Nuts | Avoid the coconuts dropped by the monkey above |
| **Tiger Electronics**<br>909 Orchard<br>Mundelein, IL 60060 | Jawbreaker | Horizontal corridors with moving doors (On-Line) |
| | King Kong | Donkey Kong derivative |
| | River Patrol | Rescue other explorers (Sentient's Congo) |
| | Marauder | Shoot robots in the maze (On-Line) |
| | Threshold | Destroy attackers in vertically scrolling tunnel (On-Line) |
| **20th Century-Fox**<br>**Fox Video Games**<br>P.O. Box 900<br>Beverly Hills, CA 90213 | Fast Eddie | Climb ladders, avoid nasties and capture floating prizes (Sirius) |
| | Deadly Duck | Shoot the silly crabs and dragonflies over head (Sirius) |
| | Worm War I | Blast monster worms in vertically scrolling cityscape (Sirius) |
| | Beany Bopper | Use 360° laser to shoot beanies and get treasures (Sirius) |
| **U.S. Games Corp.**<br>**Vidtec**<br>1515 Wyatt Dr.<br>Santa Clara, CA 95054 | Space Jockey | Another Defender. Activision Chopper Command or Spectra-Vision Planet Patrol is better. |
| | Sneak 'n Peak | Dumb hide and seek game |
| | Word Zapper | Shoot letters to make words |
| | Commando Raid | Shoot planes from cannon at bottom center |
| | Weird Bird | Catch eggs. Bad imitation of Kaboom |
| | Towering Inferno | Frustrating, random rescue game |
| | Gopher Attack | Bop gophers on the head |
| | Maze Chase | Yet another maze |

If the termites succeed in building a wall of green blocks between you and the fuel ship, you are in big trouble. The game will not win any awards for graphics, but the action-strategy combination makes Cosmic Swarm a likely prospect for your VCS library.

**Intellivision News**

If you are the proud owner of Mattel's Intellivision system, don't be discouraged by what seems to be trainloads of support only for the Atari VCS. Apparently, there are enough Intellivision consoles in use to attract several independent cartridge designers.

Activision, the multi-award winning developer of many of the most captivating cartridges for the VCS, featured two Intellivision adaptations of their Atari titles: Stampede and the new Pitfall! (see review above).

I had expected to see some dazzling graphics for these Intellivision translations—but such was not the case. In Stampede, for example, the cowboy/horse and "dogies" were scarcely more detailed than their Atari ancestors. And in Pitfall!, where the Atari version went to great lengths in exploiting graphic detail, the Intellivision screen offers only a couple of readily discernible refinements.

In conversation with Thomas Lopez, Activision Vice President of Editorial Development, I learned that the intent of these two cartridges was simply to bring the game play of two top Activision games to Intellivision users—games they would otherwise not be able to play. He assured me, however, that the company was at work on original Intellivision cartridges that will take advantage of the graphics capabilities of the system.

Over at Imagic, exciting things were happening with Intellivision cartridges. Their popular Demon Attack has been translated to the Intellivision format with the added excitement of a mammoth Mother Ship. Atlantis, a new game on the Atari side is also available for the Intellivision, with greater detail added to the graphic elements above and below the water line. An adventure game, Swords & Serpents, was shown only for the Intellivision, as was probably the most graphically unique game playable on the Mattel: Micro Surgeon.

In this unusual game, the video screen acts as a color x-ray into a human body. You see all kinds of blood vessels and internal organs as you move the view all around a body. The view is equivalent to about one-quarter of the head, and scrolling in all directions is smooth, slow and precise. Your mission inside a microscopic vehicle is to clear the body of tumors, bloodclots, nicotine deposits and a mean tapeworm—while dodging the white blood cells who see you as a foreign matter. From preliminary play, this cartridge looks like a "must" for Intellivision owners for both graphics and unique game theme.

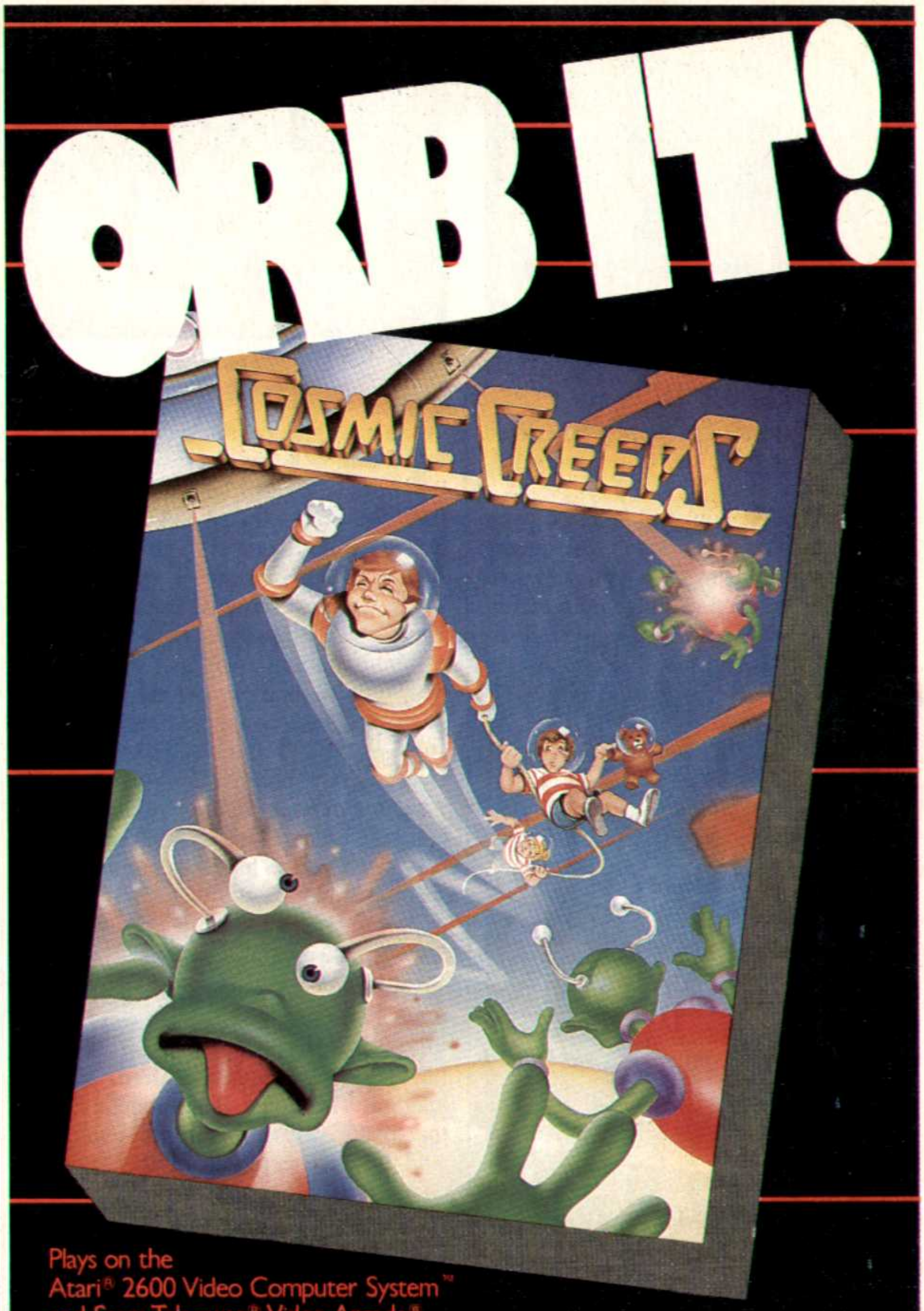
The absence of arcade-derived games for the Intellivison will be partially filled by Coleco's new Intellivision-compatible cartridges. The intitial lineup includes Donkey Kong, Venture, Cosmic Avenger, Mouse Trap, Side Trak, Rip Cord, Lady Bug, Carnival, Zaxxon, and Turbo. Only Donkey Kong was working at the show. Most of the original game elements were there for at least the first board (ramps) but the color seemed to lack the punch of the original. This may be a limitation of the Intellivision system itself, so I will withhold judgment until I see Coleco's other cartridges.

You can expect to hear more from other cartridge makers about Intellivision cartridges in 1983. The momentum is tremendous.

Of course, Mattel was there, too, showing more finished models of games announced in January, plus a more substantial display of Intellivoice, the plug-in speech synthesizer for the unit. Cartridge emphasis was placed on games that can be played solo, as well as by two players.

From the regular cartridge additions, the most desirable ones seem to be strategic games. Reversi and USCF Chess are obvious choices if you are partial to those traditional board games. Utopia is a simulation of building a civilization on an island while responding to the destructive forces of Mother Nature. And the card shark gets a load of new games for video in Royal Dealer: Hearts, Crazy

Intellivoice.



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**Telesys**
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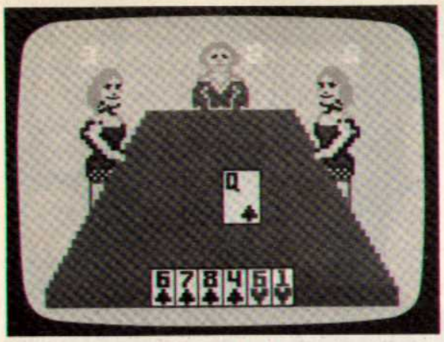
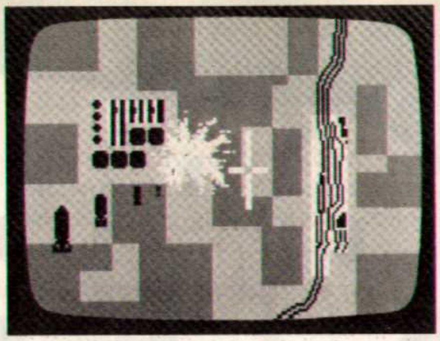


Royal Dealer.



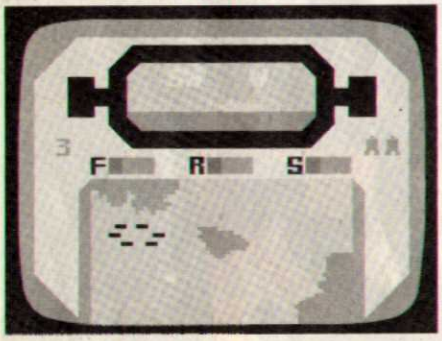
B-17 Bomber.

8's, and Rummy can be played against one, two, or three computer-controlled opponents.

On the action side, Sub Hunt puts you in command of a sub out to sink enemy ships. Your screen gives you views of both your periscope sights and a reconnaissance satellite scan of the overall situation. Two action games based on the *Tron* movie place the hero, Tron, in activities called Deadly Discs and Maze-A-Tron.

The Intellivoice add-on module is exciting—not because it is a speech synthesizer, but because the initial games designed for it have made the voice an integral part of game play.

Sub Hunt.

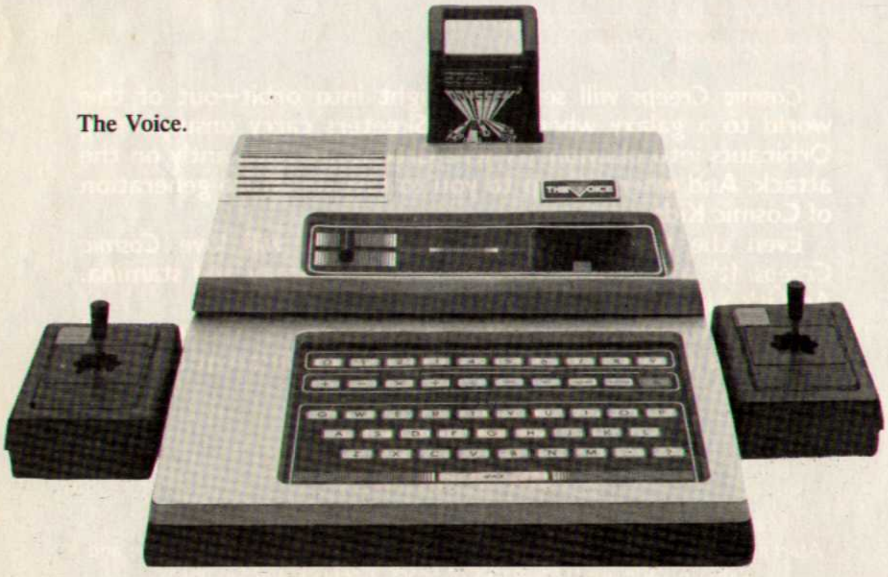


Of the four cartridges announced (excuse the pun)—Space Spartans, Bomb Squad, B-17 Bomber, and Tron Solar Sailor—B-17 Bomber is my favorite. Three different screens, a realistic aerial view of assorted targets below, the sight of bombs falling away and getting ever smaller until their explosions puff on the landscape, and the voices ranging from a John Wayne imitation to a good ol' Georgia boy bombardier—these make the game most appealing. While you are bombing a target, one of your crew members alerts you to bandits coming in at a specific angle—it is time to shift screens to do battle. Fabulous.

### Odyssey$^2$ Speaks

The only video game to sport a full typewriter keyboard, Odyssey$^2$, featured working examples of its add-on speech synthesizer called, simply enough, The Voice. The module sits on top of the Odyssey$^2$ console—blending well into the contours of the O$^2$—and connects to it by way of the game cartridge slot. A volume control is provided since, unlike Intellivoice (above), the speech comes through a speaker in the module, rather then through the TV.

The Voice.



Voice titles are: Type & Tell, S.I.D. the Spellbinder, and Nimble Numbers N.E.D. It was also announced that popular Odyssey$^2$ cartridges such as UFO would be re-issued in the future to take advantage of the voice.

While the voice quality is good (using the General Instruments speech chip set), the voice is not well integrated into the play of the cartridges—it supplements the activities, but does not add a dimension to the game. In fact, I learned from Dave Arganbright, Vice President and general manager of Odyssey division (it no longer is part of Magnavox, but its own division of NAP Consumer Electronics Corp.) that voice cartridges will be compatible with the Odyssey$^2$ unit alone, so the voice is not likely to be the key element of a cartridge. To me, that eliminates any incentive to buy the $100 voice module.

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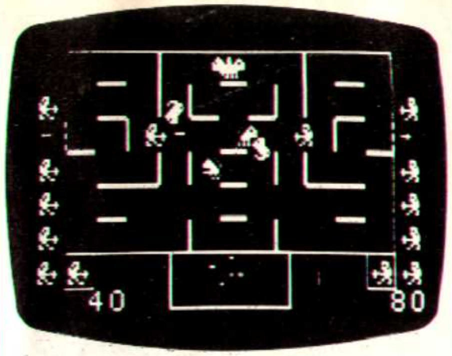
Odyssey revives their popular (until Atari pulled the plug) K.C. Munchkin character in a new cartridge called K.C.'s Krazy Chase. Pick Axe Pete is a new character in an adventure-type journey through caverns and the like, in search of a gold key.

Perhaps the best Odyssey news is that Imagic is scheduling the first independently produced Odyssey cartridges for 1983. It will be most interesting to see how fresh program approaches will be executed on the Odyssey$^2$.

### Bally's New Name, New Games

Astrocade is now the name for the deluxe home video game that started life as the Bally Arcade. The company changed its name from Astrovision,



The Incredible Wizard.

probably to keep it from getting confused with Activision, the Atari cartridge developer. By any name, this unit has one of the best graphics and sound packages of any home video game, and some new cartridges that really show it off.

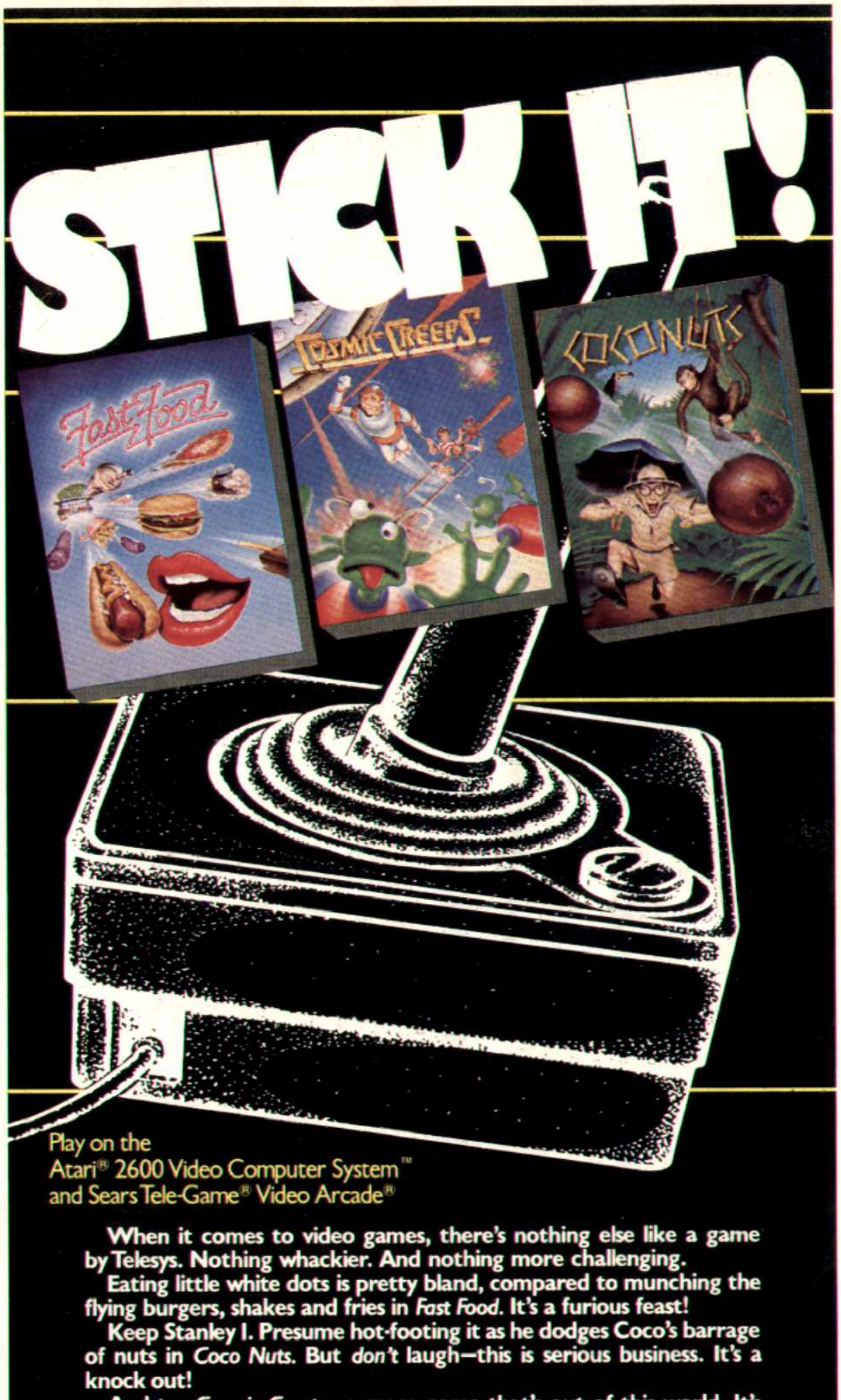
The Incredible Wizard is an incredibly good replica of Bally's Wizard of Wor arcade game. From the opening music to the between-wave screen announcements of double or quadruple scoring to an arresting light and sound show for blasting the speedy Wizard, I will take the Astrocade version over the arcade anytime.

Among other new action cartridges like Solar Conqueror, Cosmic Raiders, Conan the Barbarian (adventure type game), or Pirate Chase, the cleverest graphics award goes to Artillery Duel. The cartridge is less of a game, per se, than it is a visual delight—something you would throw into a projection TV at a party.

At the outset, a randomly selected battlefield is drawn on the screen, with a gun emplacement at each side. A small platoon of soldiers (your guys) march up to your gun. Digital indicators from a control panel display your settings for elevation and amount of powder for the next shot. Another digital display shows the wind direction and speed. Then, an

Astrocade.

astrocade
Videocade



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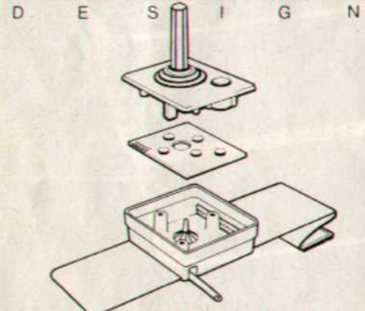

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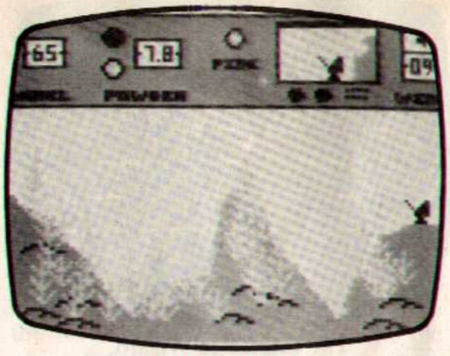


Artillery Duel.

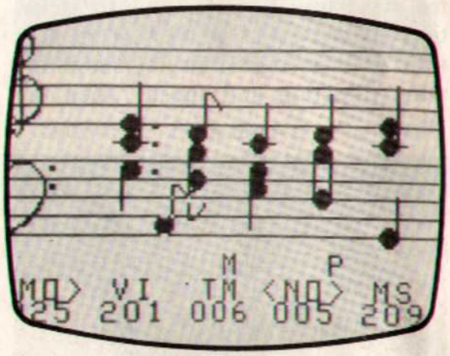
amazing color reconnaissance camera is focused on the enemy gun—you see the color monitor on the panel. To add a bit more realism, the TV image flickers occasionally.

A direct hit or enough near misses cause the enemy gun to blow to smithereens, blackening its entire hillside. Your victorious platoon leaves its gun, marching away in formation. It is really a graphics showpiece with a little bit of player interaction thrown in.

Lest you think the trajectory data is arbitrary, Astrocade advises that the game designer is a consultant to the U.S. Navy on computer programs for fire control weapons and missile systems.

Two new Astrocade cartridges may inspire the artist in you. Creative Crayon is a sophisticated graphics generation program that lets you create colorful shapes on the screen with a light pen. Music Maker lets you explore the three-voice music synthesizer of the Astrocade, with music notation showing on the screen. With both cartridges, you can store data on cassette tape for playback later.

More, Astrocade! More!



Music Maker.

### Emerson Arcadia 2001 System

If the Emerson brand name rings a bell, it is probably from a portable radio or other electronic entertainment product. This year, Emerson also means video games, with the introduction of the Arcadia 2001 video game system.

*Continued on page 98.*

## NEW COIN-OP

*Continued from page 25.*

Command Ship at the end of each round. Each succeeding round increases game action with more and faster adversaries and firepower, providing new mystery ships and points to heighten player interest and excitement.

The three-dimensional effects are produced with sophisticated new hardware and software systems. The playfield is viewed through a 3-D viewing system which allows the player to see a true three-dimensional image without 3-D eyeglasses. Dynamic stereo effects provide "surrounding" sounds of explosions, spacecraft, and sea vessels.

### Tutankham
### Stern

Stern Electronics, announces production of its latest action video game, Tutankham, a one- or two-player game licensed from Konami Industry, Japan. Konami has previously licensed to Stern such favorites as Scramble and Super Cobra.

Through the use of realistic graphics, Tutankham provides the player with abundant challenges through four phases, each increasing in difficulty. The object of the game is to find the treasure hidden deep in the tomb. The player advances carefully through a pyramid, avoiding or destroying enemies while trying to pick up hidden treasures and keys to new rooms in the tomb. The player enters a new, more difficult room by delivering the key to a locked door.

The game uses two joysticks. The left one moves the player in four directions to pick up treasures for bonus points and to search for the key. A map at the top of the screen shows where the key and door are located. The right joystick allows the player to simultaneously operate the power beam, which is used to destroy the asps, vultures, and bats. Beware, though, the player may fire only left or right. A flash button may be used to destroy all enemies at once.

During game play, the player can choose between air and sea battle as part of the special player-control features built into the game.

At sea level, the player faces various seacraft enemies which fire torpedoes and space charges. Ominous battleships head directly toward Subroc. Other warships, called destroyers, move horizontally across the screen at varying distances from Subroc, their point values changing in proportion to their distance. Tri-Fleet Carriers launch craft, which attack Subroc with lethal fireballs that cannot be destroyed, but must be avoided.

From the air, Subroc is attacked by Flying Saucers and gargantuan Airships firing lethal rockets. All the air and seacraft, their rockets and torpedoes, are targets for Subroc and when hit, score points for the player.

The final challenge of each round, the amphibious Command Ship, is the ultimate test of player skill. The headquarters Command ship can submerge below the surface of the sea, propel itself on the surface or rise above the water as a huge aircraft. It also protects itself with a Force Field which must be penetrated with a precise hit from Subroc, leaving the Command Ship vulnerable.

In later rounds, new targets, such as pirate ships, offer opportunities for mystery point scoring.

### Zektor
### Sega/Gremlin

Space game enthusiasts are put to a rugged new test in the latest video game from Sega/Gremlin. Zektor provides players with the action, speed, and sound effects of a movie space adventure.

Zektor challenges the player to recapture eight cosmic cities that have been seized by an evil cadre of alien robots. To liberate a city, the player must defeat three attack waves of enemy fighters and Roboprobes which fire lethal Zizzers at the player's ship.

Three types of Moboids can bounce, spin, or explode the player's ship. The talking male and female robots themselves can be neutralized between rounds by firing through slotted tunnels in protective, revolving barriers. The object of the game is to liberate all eight cities from alien robot occupation.

The eight space cities are depicted in vivid vector graphics as are the menacing male and female robot faces. Each robot verbally challenges the player to retake its respective city. Each round is more aggressive than the one before. Extended play can be gained by defeating the city of the eighth robot.

A new rotary player control is located in the center of the control panel. By rotating the knob either clockwise or counter-clockwise, the player steers his ship. Thrust and fire control buttons are located on both sides of the rotary player control for right- or left-handed players. ■

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# ATARI 5200 ADVANCED GAME SYSTEM

## We evaluate a sleek new system and four games

**By David H. Ahl**

The Atari 5200 is, dare I say it, Atari's answer to Intellivision, Colecovision and the Astrocade. Why a new game system when Atari already had the 400 and 800 computer systems with far more power, memory, picture resolution and overall capability than any dedicated game unit? Well, reasoned the powers that be at Atari, "the game playing world just isn't ready for a real computer."

So what we have in the 5200 is a sleekly designed, easy-to-use game playing system which—don't tell anyone—is a 400 computer in disguise. To make the disguise convincing (instead of just glasses and a false nose) Atari has subtly changed the shape and size of the plug-in cartridges. This means, 400 and 800 owners, that the *Star Raiders, Pac-Man* and other cartridges for your computer, even though the software is identical, won't plug into the 5200. Ah, the price of progress and producing a device with mass appeal.

But that is the key. The 5200 is a true mass market device. The design is attractive and contemporary. Measuring 16″ x 13″ with a sloping top of black plastic and brushed aluminum, it will fit unobtrusively in most living rooms. The wire from the controllers can be wrapped around the joystick handle and tidily stored out of sight in the compartment at the top rear.

A marvelous innovation is the single cable from the 5200 to a TV antenna switch box. The power supply which must, of course, be plugged into a wall outlet connects to the antenna switch box, not the 5200. One switch on the 5200 automatically turns the game unit on and switches the TV from regular viewing to the game unit.

The antenna switch box can handle either 300 ohm twin line or 75 ohm F cable connectors in practically any combination. However, one combination is made conspicuous by its absence. In particular, the design of the unit makes it next to impossible to hook up both an Atari VCS (or other game unit or computer) along with the 5200. Unfortunately, in a quest for simplicity and elegance (achieved), Atari sacrificed versatility.

I, for example, have an Atari VCS with over 60 cartridges and have no intention of discarding it for the 5200 and its currently available nine cartridges. However, to get them both to work on the same TV required a second antenna switch box, eliminated my all-75 ohm-coax system and defeated the 5200 automatic game/TV on-off switch. If the 5200 is your only game system, wonderful; you'll love it. If not, be prepared for an awkward conglomeration of switch boxes.

The 22-page owner's manual shows how to hook everything up in excruciating detail as well as providing hints about maintenance and trouble shooting.

### Game Controllers

The controllers attach to the 5200 with a DB-15 connector (like the DB-9 on standard Atari joysticks but with six more pins). The controllers have a 12-button soft-touch keypad at the bottom (0-9, *, #), three keys at the top (start, pause and reset), two similar pairs of firing buttons on each side and a joystick (potentiometer-type) at the top. The soft-touch buttons are a joy to use. They feel like a piece of soft/hard rubber (like a sneaker bottom) and respond to a very light touch.

The joystick itself has reasonably easy action; it would rank in the middle of the 11 Apple joysticks we recently tested. Unfortunately, one of the two joysticks with our 5200 would not reach all the way right without excessive pressure.

I frequently took apart older Atari joysticks for cleaning, modification, etc. I do not, however, recommend taking apart a 5200 controller! I did, but it was only by the grace of a good-natured fairy that I got it all back together again. As it turned out, our pre-production controller had a pinched ribbon connector which destroyed one of the deposited film traces, so it was necessary to get a replacement from Atari. Presumably, these glitches will be ironed out on regular production units.

A word about precision: Apple computer paddles (potentiometers) use a full 330 degrees of rotation for values returned to the Apple of 0 to 255 (about one degree of rotation per value). Joysticks (for the Apple) are less precise, using about 60 degrees for 256 values (about ¼ degree of rotation per value), and are thus much more difficult to adjust precisely. Next step along are the 5200 joysticks with about 30 degrees of play. Good grief, on an Apple, that would mean ⅛ degree of rotation per value.

In a practical sense on the 5200 what

this means is that the joystick cannot be precisely moved to more than about 30 locations across the screen—60 at most. Nevertheless, it is at least as good as many other controllers on the market.

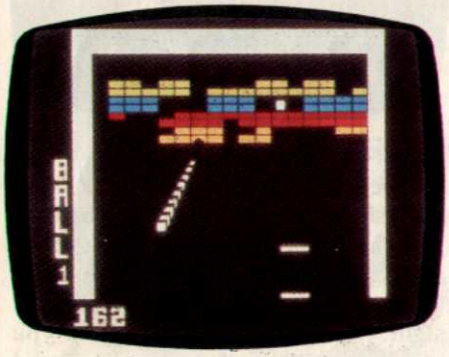
Atari promises a Trak-Ball controller for the 5200 in 1983, a voice synthesizer, and a module that will allow VCS cartridges to be played on the system. Given the difficulty of using both units with the same TV set, I would like to see this last module first.

We are also promised loads of great game cartridges—after all that is the whole reason for the system. Super Breakout comes with the 5200, and we reviewed *Centipede, Defender* and *Soccer*. Promised by Christmas were *Pac-Man, Galaxian, Star Raiders, Missile Command, Space Invaders,* and *Football*. Releases set for 1983 include *Baseball, Tank, Qix* and *Asteroids*.

## Super Breakout

*Super Breakout* is the game cartridge included with every Atari 5200. We thought this a somewhat curious choice since it hardly uses the higher resolution of the 5200 to great advantage. The screen, for example, has the same number of bricks as *Super Breakout* on the Atari VCS. However, users of the VCS will like the much better representation of alphanumerics on the 5200.

The *Super Breakout* cartridge includes the four games described below. Again, we found it curious that Atari did not include the children's version (no ball speedup and paddle does not go to half size after a ball hits the top of the screen). This is on the VCS cartridge and a nice touch for younger children or reluctant adults.



The first game is regular Breakout with eight rows of 14 bricks each. An overlay on the keypad part of the controller indicates the three active keys. One allows the player to select from one to four players, another selects the game, and the third allows a particularly hot game to be continued.

What is it like playing Breakout with a joystick instead of the usual paddle (potentiometer) control? It takes some getting used to. Although I consider Breakout one of "my games," it took me five games with scores in the "oops" range (under 100) before I got the hang of the joystick and scored a more respectable "good". But I still have a long way to go before I get a "best" rating (over 3600).

In Progressive Breakout the playfield consists of four rows of bricks at the top of the screen, followed by four blank rows, and then four more rows of bricks. The point value is defined by color: gold = 1 point, red = 3 points, blue = 5 points and green = 7 points.

Once game play begins, the brick walls slowly move down or "scroll" toward the bottom of the screen. As bricks are knocked out and the walls progress toward your paddle, new bricks enter the playfield at a progressively faster rate. As the walls progress downward, their colors change and they are worth fewer points.

In my first game, I got 266 for a rating of "fair." We are told in the instructions that when the score passes 9999 it is reset to 0000. Fat chance I'll ever see that happen.

In the third game on the cartridge, Double Breakout, the playfield is the same as regular Breakout except there are two paddles and two balls served. When both balls are in play, each brick is worth twice its normal value, but it's tough to keep both balls in play. However, the second paddle gives you a second chance with either one or two balls, and I was generally able to achieve a higher rating than in regular Breakout, although I never got near the maximum score of 2688.

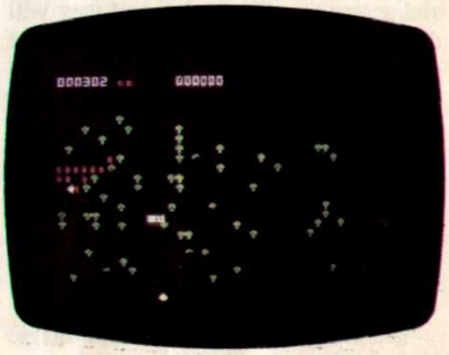
On Cavity Breakout, the playfield contains two six-brick cavities, each of which contains a ball. When the game begins, the balls bounce around inside each cavity but are held captive. There are two paddles as in Double Breakout.

The game is played normally until enough bricks are broken to release a captive ball, and then, as in Double Breakout, bricks are worth twice their point value while both balls are in play.

The excellent 11-page, full color instruction booklet gives complete instructions for each game, a score rating table, a page of helpful playing hints and a page to record your best game scores.

## Centipede

When Atari introduced the coin-op game of Centipede, it combined three incredibly important innovations. First was the Trak-Ball controller, a marvelous device which enables the player to spin a ball to control the movement of his base (player, tank, etc.). Second was the rapid fire button which is simply held down for rapid fire instead of having to be pressed repeatedly. Third, and probably most important, it was a shoot-'em-up game based on a whimsical concept. Why most important? Because it attracted women to play.



In the instruction booklet for the 5200 cartridge, Atari has enlarged upon the whimsey.

**Enchanted Forest**

"One glorious spring day you hike into a dense forest that you've never before explored. As you push deeper into the woods, the trees close up behind you and the forest grows increasingly dark and ominous. You get a creepy feeling and decide to go back. A chill plays up and down your spine when you turn and realize you're lost. You collapse onto a flat rock beneath an enormous, spreading tree and try to regain your sense of direction. A grey squirrel chatters at you.

" 'How do I get out of here?' you sigh out loud. To your amazement, the squirrel speaks!

" 'Help us and we'll show you the way home,' promises the squirrel.

" 'What?'

" 'This is an enchanted forest,' explains the squirrel. 'There's an evil centipede here who leads a deadly spider, blood-sucking fleas, and a poisonous scorpion against us small animals. We've waited a long time for a heroic human to enter our realm and release us from the centipede's cruel dominion. Will you help?'

" 'I guess so. But how?'

"The forest rustles as dozens of small

animals rally round you. Rabbits, birds, deer, raccoons, muskrats, butterflies—and more creatures than you can name, appear. A bird flies over, releasing three white feathers.

" 'Catch those.' The squirrel instructs.

"As you catch the feathers they transform into three glowing wands.

" 'Now you can go into battle for us,' says the squirrel. 'With those magic wands, you can shoot sparks at the centipede. When any section of the centipede is hit, it turns into a powerless mushroom. You can also stun the spider, fleas, and scorpion with sparks, and they will disappear for a short time. But, if one of them bites you before you spark it, you lose consciousness, and your magic wand is snatched away.'

"Suddenly, you hear a leaf-shaking shriek, and the animals scurry about in a frenzy of terror.

" 'Look out!' cries the squirrel, 'Here comes the centipede!' "

### Game Play

You start the game with three magic wands. You win a congratulatory tune and a bonus wand every time you score 12,000 points. You can have a total of six magic wands at one time. When you lose all your wands, the game ends.

If a centipede, spider or flea bites you, your wand is snatched away, you are temporarily paralyzed, and the game momentarily stops. All mushrooms that you partially destroyed during the battle are restored, your score for these is added to your running score, and the rejuvenated centipede attacks from the top again. You must replay the previous wave until the centipede is totally destroyed.

At the start of the game, the screen is partially filled with mushrooms. The centipede consists of 12 body segments. It starts from the top of the screen and winds down toward you, dropping one level each time it hits a mushroom. Hitting the head segment is worth 100 points while a body segment is worth 10. Hint: shoot vertical columns through the mushrooms and get the centipede when it comes down a column. As you hit the head, the next body segment turns into the head, you shoot it, and so on, thus earning 100 points for each section of the centipede instead of a paltry 10.

But watch out! The spider jumps all over the bottom of the battlefield (where you are) distracting you and trying to wipe you out. Spiders are worth 300 to 900 points depending upon their closeness to you when shot.

Mushrooms are easily shot but they are worth only 1 point each. Furthermore, if you clear an area of mushrooms, the flea will drop from the top of the screen, leaving mushrooms in his wake. A flea can be shot twice for 200 points, although the risk of getting under him is seldom worth it. Better to concentrate on the centipede, spider, and scorpion.

Scorpion? Oh, yes! Starting in the third wave, the scorpion scurries across the middle of the battlefield, leaving poisoned mushrooms in his wake. He is worth a whopping 1000 points, but in your eagerness to get him, don't forget the other dangers.

The game can be played by one or two players at any of three skill levels (easy, standard or hard). The joystick moves your magic wand, and the soft-touch button shoots. Atari promises us a Trak-Ball for the 5200 eventually. I can't wait.

The instruction book doesn't give a score rating chart as in Super Breakout. On the easy level, I was scoring around 6500 my first few plays, and curiously enough, around 8000 on the standard level. On the hard level, my scores tended to be in the 4000-5000 range. In general, I suspect you can consider these scores in the "oops" category are probably relatively meaningless. My 10-year-old son scored 11,500 on his first play, but then he plays Centipede in the arcades. After watching him for 11 or 12 plays, I started getting really discouraged.

Nevertheless, I think the game is delightful fun even though I will certainly never see the score counter roll over at 99,999,999. Are they kidding?

## Defender

Atari 5200 *Defender* is similar to the arcade game in action and strategy, but instead of the six controls in the arcade game, the home version has only the joystick controlling all firing and maneuvers.

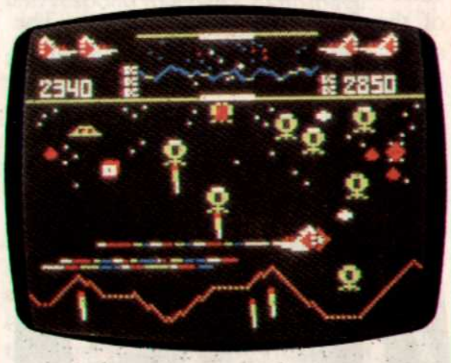
Basically, the game consists of your space ship (Defender) and aliens manning various types of spacecraft. They are intent upon not only destroying your ship, but also kidnapping the inhabitants of the city. (Apparently, they have been pretty busy, since there are only a few humanoids left.) Once kidnapped, the humanoids are changed into mutants and return to earth to get you, and eradicate all vestiges of civilization.

Since you alone are responsible for the protection of the city, your aim is to destroy the aliens and their ships.

The instructions tell us that "the alien force is made up of six different types of ships: Landers, Bombers, Swarmers, Baiters, Mutants, and Pods. Landers are the first to appear. They search the cities for humanoids to kidnap and mutate. Bombers lay mines to trap you. You cannot shoot mines, so it's best to avoid them.

"Swarmers are housed in Pods. Several Swarmers are released each time a Pod is destroyed. They track you closely, so kill them the instant they appear. Baiters usually appear near the end of a wave. They're large, they shoot fast, and they move faster than your Defender.

"A Mutant is a transformed Humanoid. Mutants are very dangerous; use all your energy to kill them. If the Landers kidnap all the Humanoids, and carry them to the top of the screen to transform them to Mutants, the entire planet explodes. The most deadly alien of all is the mother ship, also known as a Pod. When a Pod is destroyed, it releases five to seven deadly Swarmers.



### Your Defense

"Defender fires missiles to blast the alien ships. But, when things look bad, you can employ one of two last resort weapons. First, you have three smart bombs which blow up every alien in sight. With every 10,000 points you score, you earn another smart bomb and another Defender life. Use smart bombs sparingly and strategically. It is a good idea to keep one smart bomb in reserve in case you get stuck and need a little help to earn another Defender life.

### Rescuing Humanoids

"Here is where the heroics come in. Your mission is to destroy aliens while protecting Humanoids. At the end of a wave, you score 100 bonus points for every Humanoid survivor multiplied by the number of the wave just completed (up to a maximum of 500 bonus points).

"All the Humanoids are stranded helplessly within the cities at the bottom of the screen. You are their only hope for survival. Use the scanner to patrol their positions. When a Humanoid is being abducted by a Lander, you'll hear his cry for help. Go to his rescue immediately."

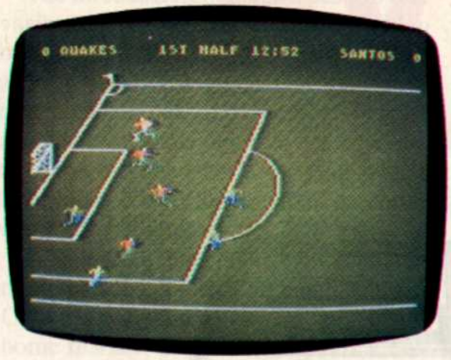
There are seven game variations in Atari *Defender*. All provide a substantial challenge to the most seasoned space gamers.

## Soccer

Your object in *Soccer* is to score points by maneuvering the ball past your opponents and into their goal. When you press the Start key, the computer positions the men according to which team kicks off. Each team has five players: four fielders and a goal keeper. You control one fielder wearing a lighter shirt than his teammates while the computer controls the other three fielders and the goalie. The home team wears blue and the visitors red.

The game can be played by one player against the computer or two players against each other. In single player games, the computer can be set to play at one of four skill levels from Beginner to Expert.

The game consists of two halves which may be set to last from 5 to 45 minutes (real time). We found five- to ten-minute halves most satisfying.



As referee, the computer blows the whistle to call penalties and signal the end of the half, and places the ball for kickoffs and penalty plays.

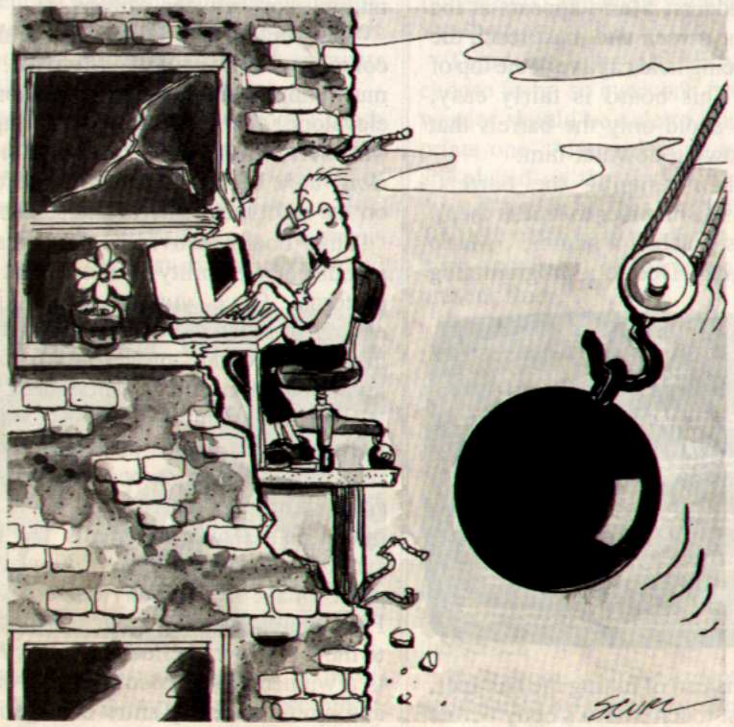
At the start of a half, the ball is placed on the center line. To kick the ball, you set the type of kick on the keypad (low, medium, high or ground) and press one of the red buttons on the side of the controller to send the ball on its way. To help you move the ball and score, you can set throw-ins and corner kicks using the red buttons. To intercept the ball from your opponent, you run toward him and attempt to kick the ball toward your destination.

In playing *Soccer* we realized that it helps to have a knowledge of soccer itself but it also involves some luck and skill using the controller. Because of the excellent, realistic graphics (field perspective, ball shadows, player movement) and its similarity to the real game, it quickly became one of my favorites. As in the real game, I had the most trouble getting the ball past the goalie. Also, the ball continues rolling after a kick and frequently goes out of bounds unless you get a player into position to receive the pass.

I enjoyed the game very much, as did my brother, because we sometimes felt as if we were actually playing soccer. We feel the excitement can be shared by all members of the family. The excellent 15-page instruction booklet fully explains other options such as "Auto Play" (watch the computer play against itself) and provides a page and a half for recording your best scores.

*—Darcy Ahl*

**Q: What is the hardest thing in the world?**
**A: Tearing yourself away from an EPYX game.**



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# ColecoVision: ALIVE WITH FIVE

COLECOVISION

### By Owen Linzmayer

Software support for the recently introduced ColecoVision home video system is coming on strong. In an effort to attract consumers, Coleco has already released five arcade game cartridges: *Donkey Kong, Cosmic Avenger, Venture, LadyBug,* and *Smurf Rescue*. Although their appeal is varied, all of the games have one thing in common: quality.

## Donkey Kong

Each ColecoVision system comes with a free *Donkey Kong* cartridge. It was not by accident that Coleco decided to include this particular game. What better way to entice a buyer than to throw in the number one coin-op game? Coleco did a fabulous job with their first release. *Donkey Kong* is definitely the most impressive of the first five cartridges, and it's free.

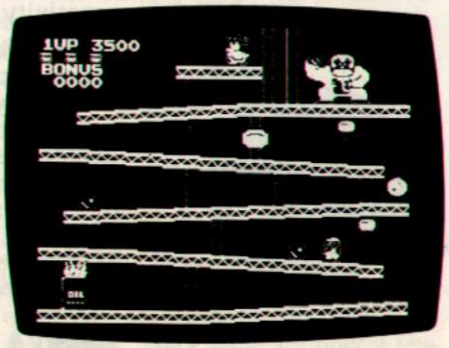
Any reader not familiar with *Donkey Kong* has probably spent the last year locked in a closet with Rubik's Cube. For you dyed-in-the-wool puzzlers, let me set the stage. In *Donkey Kong*, the player assumes the guise of Mario (the Jumpman), whose beautiful girlfriend has been kidnapped by the evil ape, Kong. Mario, heroic guy that he is, must save the girl—or die trying.

There are four separate playscreens in Nintendo's coin-op version of Donkey Kong; the ColecoVision adaptation has only three.

After inserting the ROM (read only memory) cartridge into the ColecoVision, you have a choice of difficulty levels. There are four levels, but the distinctions during game play are subtle. As with all of the Coleco games, you must also select either a one or two player game. Unfortunately, players cannot pick independent difficulty levels.

Once the options have been chosen, you advance to the game itself. The first scene is composed of five ramps connected by ladders. Mario appears at the bottom of the screen and must reach the girl who is being held captive at the top of the board. This board is fairly easy; Mario must avoid only the barrels that Kong is throwing down at him.

Rather than jumping the barrels, Mario can use a hammer to smash them. Once he has grabbed a hammer, Mario starts swinging. Due to a programming oversight, instead of hitting the hammer, a barrel must touch Mario's body before it is destroyed. The hammer disappears after 13 seconds of use, but there is nothing that warns the player when this is about to happen.



While the Jumpman is running around on the ramps, a timer in the upper left-hand corner of the screen slowly ticks down. If this timer reaches zero, you lose a man. If at any time during play you lose a man, you must start the screen over; from the very beginning. When you complete a screen, the bonus remaining on the timer is added to your score and you advance to the next board.

The second board is commonly known as the "rivets" screen. You must remove six rivets by walking over them. When all six rivets are gone, the screen is completed. Extra points are awarded if Mario picks up the accessories that Kong has scattered on the girders.

The obstacles on this screen include menacing firefoxes, balls of flame that are deadly to the touch. Luckily, the firefoxes are incredibly stupid. Completing this screen should be relatively easy. One thing that is missing in the ColecoVision version of *Donkey Kong* is a short intermission between screens.

> **Any reader not familiar with Donkey Kong has probably spent the last year locked in a closet with Rubik's Cube.**

The third screen is very difficult to complete. While avoiding firefoxes, you must jump around a series of platforms, elevators, and ladders. The springese (mashers) from the coin-op *Donkey Kong* have been replaced with firefoxes on the right hand side of the screen.

This board provides the greatest amount of flexibility in movement and patterns. Once you become skilled enough to finish this board, it becomes a huge playground—providing an excellent place for you to show off your talents. After completing this screen, the program again cycles through the three screens and the game becomes progressively more difficult.

Coleco's *Donkey Kong* is the most faithful adaptation of the original video game I have seen on any home system. From the "cutesie" graphics, right down to the jovial sound effects, *Donkey Kong* is a winner. The freedom of movement and limitless variety allow each game of *Donkey Kong* to be new and exciting.

## Cosmic Avenger

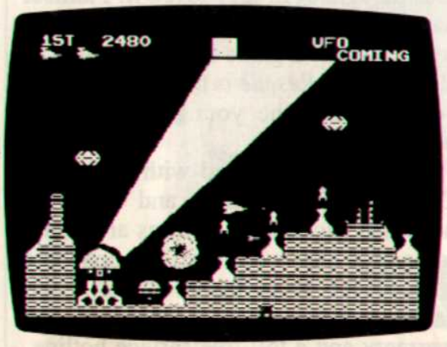
After the success of Stern's Scramble, a flurry of games based on a similar theme arose. One of the better games to surface was Cosmic Avenger from Universal. Although not very popular in the coin-op halls, Cosmic Avenger looks promising in its home version.

Cosmic Avenger satisfies my craving to see enemy forces laid waste on my television screen.

The object of *Cosmic Avenger* is to fly your fighter over enemy terrain and destroy as much as possible. The landscape below you scrolls from right to left. As an object passes by, you can either shoot it or drop a bomb on it. Meanwhile, you must avoid the missiles that the enemy is firing at your jet. There are three landscapes: city, open field, and underwater. Each landscape contains its own special form of attack, and your strategies had better change accordingly if you plan to survive.

There is a radar scope in the top center of the screen to help you spot hostile saucers. Saucers are especially threatening because they move randomly as they fire bullets at you. Without the saucers, the lower difficulty levels would present no problems whatsoever. Unfortunately, the higher levels become very difficult—sometimes three saucers attack simultaneously.

I personally like to play a good "death and destruction" game every so often. *Cosmic Avenger* satisfies my craving to see enemy forces laid waste on my television screen. The explosions are primitive, but the graphics overall are detailed and realistic. Considering the amount of video that must be moved, the scrolling of the terrain is quite smooth. One thing I have noticed is that when there are quite a few moving objects on the screen, some will flicker on and off. This is distracting and makes the game more difficult. Rather than sacrifice game playability, the designers at Coleco must have decided to live with the occasional flickering.



The three different landscapes provide variety with an ever-changing video background. The only thing I don't like about *Cosmic Avenger* is that the transition between the above-ground terrain and the underwater landscape is unrealistic. One moment you are flying over a field and suddenly the mouth of an underwater cavern appears out of the sky.

Although *Cosmic Avenger* was not terribly popular in the arcades, I think Coleco's adaptation will do well in the home market. *Cosmic Avenger* is a nice addition to the rapidly expanding ColecoVision software library.

## Venture

When Exidy released their new arcade game, *Venture*, in July of 1981, they hoped to cash in on the fantasy role playing market. *Venture* was the first video game that catered to the special interests of dungeon dwellers across the country. The player had one object: infiltrate an underground maze complex and steal as much treasure as possible.

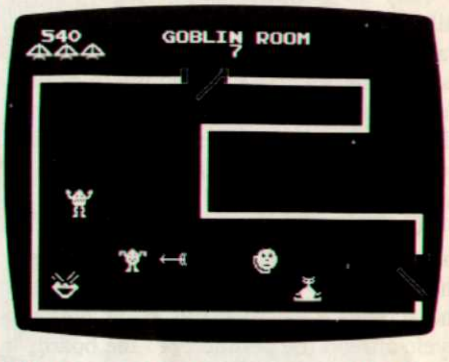
With the *Venture* cartridge, ColecoVision owners can now participate in plunderous campaigns without ever leaving their armchairs.

There are four difficulty levels to choose from, so everyone from wimp to warrior should be able to find an appropriate one. After selecting a level, you are placed on the first floor. There are three floors in all, each with four rooms. To delve down to the next floor, you must snatch all of the treasures on the present floor.

A floor is made up of hallways and four irregularly shaped rooms. When your character, Winky, is in a hallway, the screen is filled with a large overhead view of the entire floor. You are represented by a little red dot and the green things running after you are called Hallmonsters. The object is to enter a room while avoiding contact with the Hallmonsters. When you go through a door, an overhead view of that room fills the screen.

Each room, with the exception of one, is inhabited by at least three monsters. If you are skilled enough, you can kill these monsters with your bow and arrows. Using the joystick and the left firing button allows you to move or shoot in eight directions.

If a monster is shot, it starts to decay. Touching a decomposing monster is every bit as fatal as running into a live one. To grab a treasure in a room, simply pass Winky over it. The treasure will blink and your exit will be accompanied by the William Tell Overture.



The biggest complaint I have about *Venture* is that there are only 12 rooms. After you loot the first three floors, the computer cycles through them again and again. If you manage to survive three cycles, the computer simply keeps you on the third floor. With the exception of this fault, ColecoVision *Venture* is just as enjoyable as the arcade version. Nothing from the original is missing, except the coin slot.

## LadyBug

*LadyBug* is the second arcade game licensed to Coleco by Universal. After a cursory glance at the game, many people cry out "Oh no, not another Pac-Man." But *LadyBug* is not one of the many Pac-Man rip-offs. If you take the time to watch a game of *LadyBug* in action, you soon realize that there are player-movable turnstiles that set it apart from all other maze games.

For lighting up all the letters in the word Special, you are awarded a romp through a vegetable garden.

The general description of *LadyBug* sounds very similar to Pac-Man: you are trapped in a maze that is littered with dots that you must eat without getting caught by the monsters. LadyBug differs from Pac-Man in that there are turnstiles, hearts, letters, and skulls lying around in the hallways.

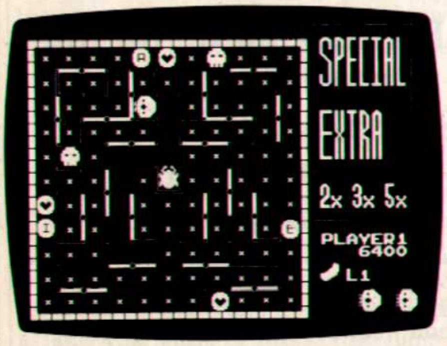
Only the LadyBug can swing a turnstile 90 degrees; this gives her a big advantage in escaping the jaws of the rampaging insects. Running into a skull proves deadly for player and monsters alike. Eating the hearts and letters takes concentration and coordination if maximum scores are desired.

As the game is played, two independent timers are running. The first timer is the green and white border that outlines the screen. Each time this completes a cycle around the perimeter of the board, another insect is released into the maze. The second timer is not visible. It controls the interval at which the hearts and letters change color.

These objects cycle through red, yellow, and blue. If a heart is eaten while it is blue, the base point multiplier advances. If you eat a letter when it is either red or yellow, that letter lights up in the word Special or Extra respectively. This takes a while to get used to, but soon you can rack up a tremendous number of points by taking full advantage of these scoring opportunities.

There are some differences between the original and the Coleco adaptation of *LadyBug*. In the ColecoVision version, instead of winning a free game for lighting up all of the letters in the word Special, you are awarded a romp through a vegetable garden. If successfully harvested, the vegetable garden can cause your score to double, even triple.

Another major difference is the difficulty levels. While playing the Coleco version, the insects become incredibly fast on the ninth board. The coin-op game progresses at a slightly slower rate. There is not that much difference in the four selectable difficulty levels in *LadyBug*. This lack of difficulty control means that *LadyBug* may be a little too hard for young children.



We at Creative Computing have the pleasure of having a full-sized coin-op LadyBug machine right outside the company lunchroom. Quite a few lunchbreaks have been extended for "just one more game." When the *LadyBug* cartridge arrived, I ran to our ColecoVision console and plugged it in. Within minutes word had spread and the line that had been waiting outside the lunchroom was anxiously peering over my shoulder. Ever since we got our copy of Coleco *LadyBug*, the coin-op version seldom gets a workout. Coleco's version is just as much fun as the original and it doesn't run on quarters.

## Smurf Rescue

Pac-Man was the first to make the transition from video games to Saturday morning cartoons. Hoping that this can be done in reverse order, Coleco has introduced *Smurf Rescue*. The little blue hobbit-like creatures who invaded the country last year now have their very own arcade game.

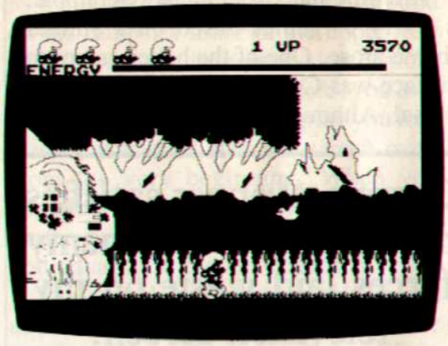
Gargamel has kidnapped the one and only Smurfette. It is up to the Smurf player to risk life and limb in an attempt to rescue the defenseless Smurfette from the clutches of the evil Gargamel.

**The graphics in Smurf Rescue are hi-res and detailed.**

I must admit, I was a little bit cynical when I heard that Coleco was going to introduce this cartridge. I was sure they were just milking the Smurf theme for all it was worth. Not so. Upon playing the game I found it was truly good fun!

Your Smurf starts off at his little home and must travel far off into the distance at the right if he hopes to see Smurfette alive again. There are five terrains that you walk through: a forest, open fields, an underground cavern, the castle, and finally, the room where Smurfette is held. Dangers include fences, bluffs, sharp blades of grass, stalagmites, hawks, bats, and spiders. Your Smurf can run, jump, or duck to avoid these dangerous things.

The graphics in *Smurf Rescue* are hi-res and detailed. The walking action of the Smurf looks very realistic. One thing we found humorous is that your Smurf never changes his facial expression; no matter what is happening, he continues to walk around with that "I-don't-care" smile of his.



When Smurf reaches the rightmost side of the screen, the entire scene shifts over to the left and a new scene appears. Since each new screen is selected at random, a player can go back and forth between two screens until he encounters one to his liking.

The difficulty level you choose determines the distance you must travel and the number of Smurfs you have in reserve. Running into any of the obstacles causes you to lose a Smurf. You can also lose a life if you run out of energy. Energy is exhausted as time goes by and as Smurf engages in jumping activities. Each time you enter a different terrain, your energy is restored to full strength.

In the final scene, Smurf must hop onto a skull from which he jumps to save Smurfette. Once done, he receives 10,000 points and starts another mission from the beginning. Unfortunately, after Smurfette is rescued, the game does not increase in difficulty.

With its range of difficulty levels, *Smurf Rescue* presents a challenge to very young children as well as to the older crowd. I took the ColecoVision home once to see what the neighborhood kids thought of it; they loved it. I almost had to evict them from my house at night so I could get a game in before going to sleep. *Smurf Rescue* is bound to be a favorite among the youngsters in your house; it's *so* cute.

I am very impressed with these five ColecoVision cartridges and can only hope that succeeding releases are of the same high quality. Coleco has done one heck of a job with software support. Each cartridge is backed by a limited 90-day warranty and a toll-free service hotline. Take heart video masters, there is finally a company that takes us as seriously as we take our games. ■

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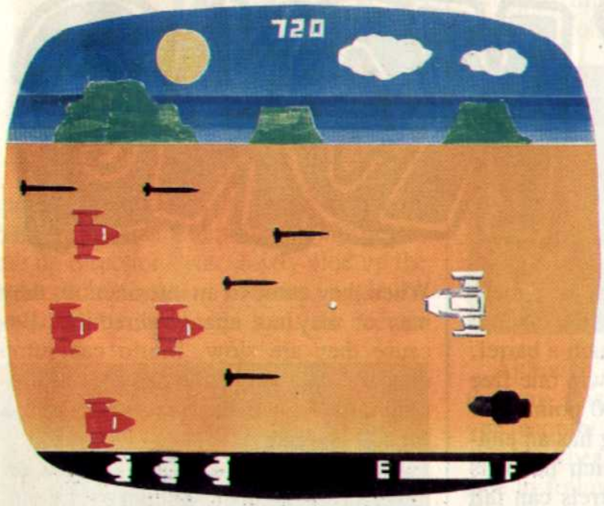

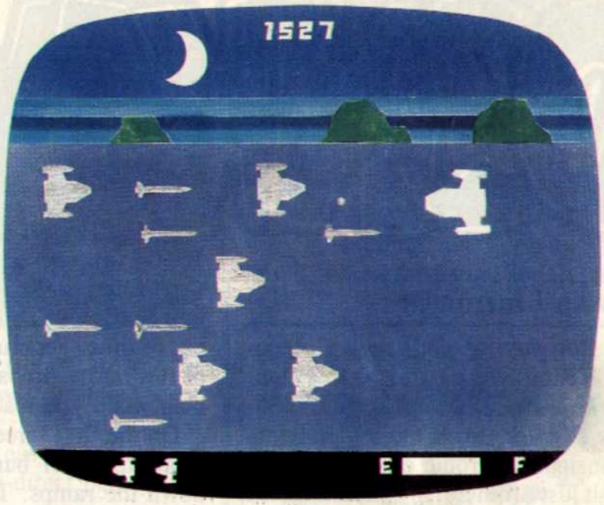

You're one of the best fighter pilots in the galaxy, but your mission is awesome: Repel all evil forces and destroy them before they destroy you. As you guide your ship expertly across the colorful landscape, you must dodge and shoot down the lethal missiles bent on your destruction. You must also destroy the menacing mother ship. And that's not all. You must summon up all your skill to rescue downed pilots, and yet still must land your ship periodically for refueling.

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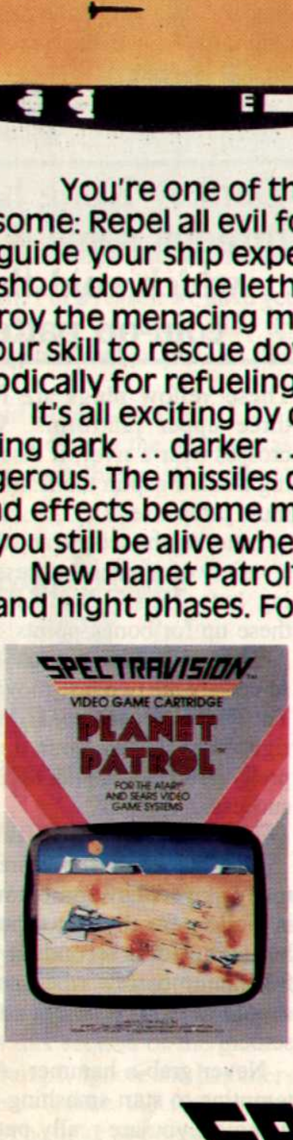
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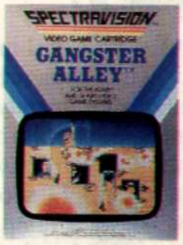
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CIRCLE 27 ON READER SERVICE CARD

# DONKEY KONG

### By Owen Linzmayer

After buying your new ColecoVision, you plug in the free *Donkey Kong* cartridge and confidently sit back, expecting a few hours of whimsical electronic enjoyment.

"Wait just a minute, my patterns don't work on this game," you whine after losing a man on the first screen. In the transition from the arcade to home, *Donkey Kong* has gone through some overhauls which void the old coin-op patterns. But fear not, we at Creative Computing have devised trustworthy patterns for the ColecoVision version of *Donkey Kong*. Follow them to higher scores.

The keypad on the joystick is used to select the difficulty level of the game. Since you want to see all three screens and rack up high scores, choose option 1, the easiest. Pushing the joystick right or left causes Mario to move in that direction. To make Mario climb a ladder, push the joystick up when he is at the bottom of it. Pressing the left button on the joystick controller makes Mario jump in the direction he is moving.

Below the score indicator is the bonus timer. When the timer hits 1000 points, a warning is sounded. If it reaches zero, you die. If you complete the screen with time remaining, you are awarded bonus points.

Our hero, Mario the jumpman, is dressed in red overalls topped with a matching cap. If you select game option 1, you begin the game with five men. You can lose a life if you fall too far, run out of time, get crushed, touch a barrel, or run into a fireball. You win one free man when you reach 10,000 points.

On the first screen, Kong has an endless supply of barrels which he rolls down the ramps. These barrels can fall off the edge of a ramp or roll down any ladder. Contact with a barrel is deadly, but luckily Mario can destroy them if he is holding a hammer. Barrels can be jumped from a standing position, but a running jump is safer.

The hammers that hang in mid-air provide temporary immunity to barrels and fireballs. When he grabs a green hammer, Mario swings it wildly overhead for 13 seconds. If a fireball or barrel makes contact with his body while he has a hammer, it is destroyed. Unfortunately, he cannot climb ladders or jump while holding a hammer. On the first screen, to release a hammer before the 13 seconds expire, walk off the end of a ramp.

There are two types of ladders that you encounter, broken, and unbroken. The unbroken ladders are used to climb from one level to the next. To avoid a barrel that is rolling in your direction, you can choose to climb a broken ladder. You cannot move to a higher level, but you can get out of the way of danger.

Fireballs are found on the second and third boards. These guys are tricky because they act in a random manner. When they come to an intersection, they may or may not change direction. Because they are slow, Mario can jump over fireballs only if he has a good running start. As with the barrels, touching a fireball is deadly.

The object of the second board is to remove all six rivets by walking over them.

> **Donkey Kong has gone through some overhauls which void the old coin-op patterns.**

These yellow plugs are found on the three upper platforms. When Mario crosses over a rivet, it disappears, leaving a small gap in the framework that he must jump over.

Littering the second and third boards is a variety of women's accessories including hats, purses, and umbrellas. Pick these up for bonus points.

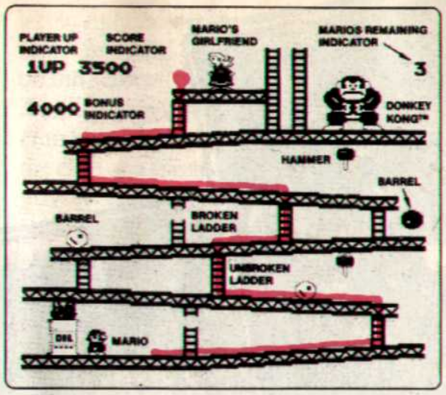
The only new things on the third screen are the two fast-moving elevators. The left one moves up, and the one on the right goes down. Your timing must be pretty good if you plan to ride these with success.

#### First Screen—Ramps

This screen is the easiest. Even so, many players have problems completing it. Follow the illustrated pattern without hesitating for a second. If you successfully jump barrels when necessary, you should have no problem completing this screen.

Never grab a hammer. Although it is tempting to start smashing things with a hammer, you are really putting yourself in unnecessary jeopardy. Hammers last for 13 seconds, but there is no color change to indicate when one is about to disappear.

You must learn how to climb ladders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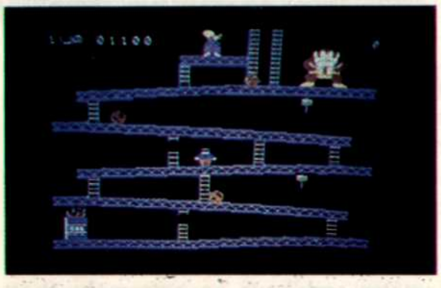
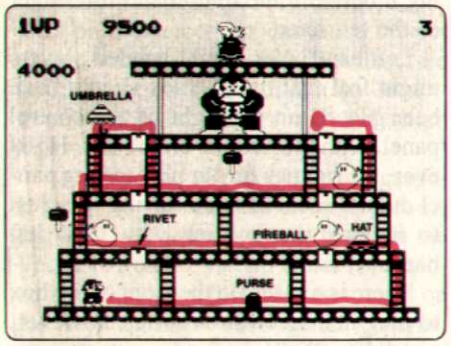
HAMMER
BARREL
BARREL
BROKEN LADDER
UNBROKEN LADDER
OIL
MARIO

quickly. If you simply walk over to the base of a ladder and point the joystick in the up direction, you slowly plod up the ladder. To shoot up a ladder, jiggle the joystick between up and the center "off" position. For a reason we have yet to determine, Mario seems to slide up ladders like lightning when you use this technique.



### Second Screen—Rivets

The pattern shown in the picture was designed with two things in mind: to break up the three fireballs so that they don't gang up on you all at once, and to allow the player to grab all three accessories. Because the fireballs act randomly, you have to be more careful as you proceed through this section of the game.

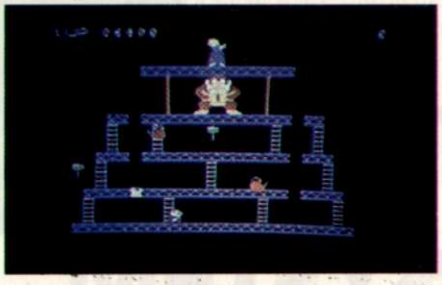

1UP 9500
3
4000
UMBRELLA
RIVET
FIREBALL
HAT
PURSE

As on the ramps, ignore the hammers on this screen. Unlike the first board, here you must hesitate at times, waiting for a fireball to get out of your way. Don't be afraid to stand around waiting for a while.

If you see that you will definitely lose a man by staying in one place, then by all means move. You probably took too long doing something, thereby upsetting the delicate timing required to complete this board.

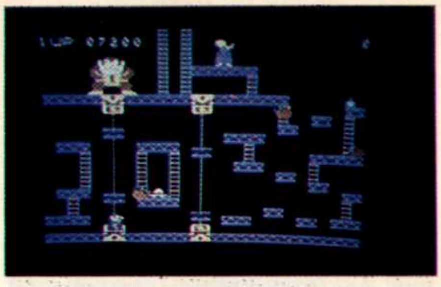
### Third Screen—Elevators

This is the hardest screen, but don't let that scare you. If you are skilled enough to reach this board, you have enough talent to complete it.

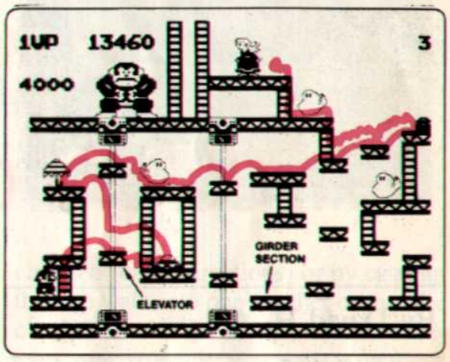


Although the accessories are out of the way, this pattern was designed to let you acquire all three of them. If you would rather take the easy way out, feel free to follow a more direct path to the final ladder.

As on the second screen, avoid the fireballs at all costs. Again, don't feel bad about waiting for a fireball to get out of the way. You have more than enough time to complete this screen.



The wiggly lines on the picture illustrate a fall. There are certain distances that you can safely fall, but most people don't know about this. Wherever you see the wavy lines, that means you should walk in that direction, allowing yourself to fall. Avoid the temptation to jump. ■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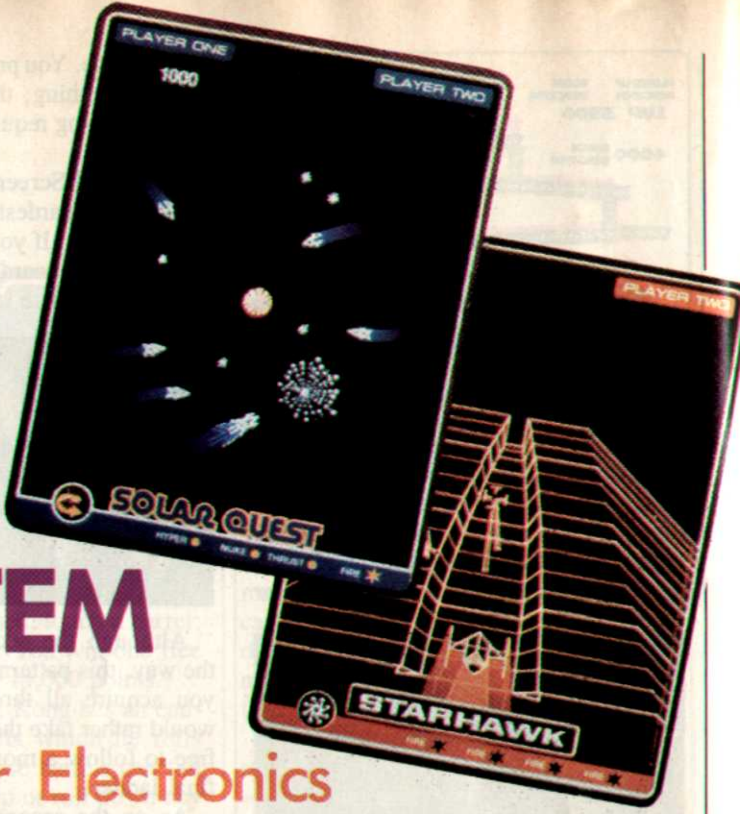
# THE VECTREX ARCADE SYSTEM



## From General Consumer Electronics

**By David H. Ahl**

"Not another one," said Derek. "But this is different," I said. "It uses vector graphics."

"Vector, shmector, what's the difference? What we need are some new games, not new graphic systems."

That, more or less, was the gist of my conversation with Derek after returning from the summer Consumer Electronics Show. I was enthusiastically describing the Vectrex Game System and he was anything but enthusiastic.

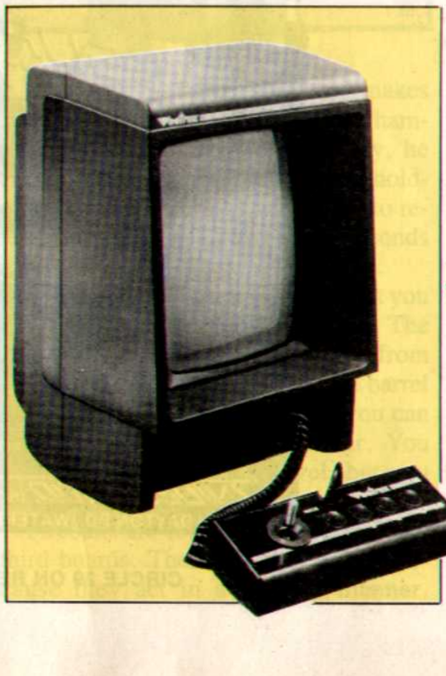
Now, five months later, we have our hands on an actual machine. Derek could be reached for comments only between plays of Scramble and Berzerk. His comments were along the line of, "Wow! This is fantastic! Look at that explosion! I don't beleive it! It's like a coin-op!"

Yes, folks, Vectrex is all of those things. Vector graphics really do make a difference, and the strong line-up of games helps immensely.

### The Vectrex Box

Vectrex is a self-contained system housing a microprocessor and display. A small control panel toward the bottom hinges forward and lifts off. This is connected to the unit by means of a coiled telephone-type cable which can be stretched to about two feet. The box itself is 9″ wide x 14″ high x 11″ deep. A slot for a plug-in cartridge is on the right side. The rectangular 6″ x 8″ screen is vertically aligned, opposite to most TV sets but similar to many coin-op arcade games.

There are just two controls on the box itself, an off-on switch/volume control and a reset button. The control panel has a potentiometer-type joystick at the left and a row of four pushbuttons at the right. The joystick handle is only ¾″ long, one of the shortest we have seen in our evaluations of game machines and joysticks. The pushbuttons are 0.6″ in diameter and have an extremely short throw, providing very rapid response to firing, thrusting, dropping bombs, etc.



Although we initially had reservations about the joystick because of its small size, it turns out that it gives the player good, precise control of objects on the screen and is easily manipulated by holding it between the thumb and forefinger of the left hand.

Left hand? Yes. Right-handed players might feel that the joystick should have been placed on the right of the control panel, with the buttons on the left. However, the righties on our play testing panel did not seem to mind having to adjust to moving the joystick with their left hands.

There is a place on the front of the box to plug in a second controller, however, we did not have one, so our tests were done with just one.

### Vector Graphics

What are these vector graphics about which Derek was so unenthusiastic until he saw them?

Perhaps it is best to describe "ordinary" raster scan graphics first. Raster scan graphics are found on most TV sets and video monitors. A picture is generated by an electron beam scanning from left to right across the face of the tube 525 times in 1/30 of a second. For each point on the screen (pixel), the electron gun in the CRT is given a signal by the computer to either light or not light that pixel. In the case of a monochrome signal, there is just one electron gun, while in the case of a color signal there are three guns (red, green, and blue).

To move an object on the screen (animation) the old object is "erased" (the pixels defining it are turned off) and the object is illuminated in a slightly different position. If the two objects (the one being erased and the new one being drawn) are close together, the effect is one of continuous movement. This movement takes place at the rate of 30 frames per second, plenty fast for good animation in computer and coin-op games.

Vector graphics, on the other hand, use a "refresh" type of CRT tube. In this type of tube, the electron gun does not sweep across the entire tube turning the pixels on and off. Rather, the gun moves from the beginning to the end of a line segment and energizes (lights) the phosphor in between. The associated electronics keep this segment lit until another signal comes along which says, in effect, "turn it off."

Since the electron gun is not regenerating the entire picture every 1/30 of a second, but rather going to only those points which are changed from the previous picture, much quicker animation and movement is possible. Furthermore, objects on the screen appear much crisper than in a raster scan system. In effect, the screen appears to be drawn by an extremely fine-line plotter with very high resolution.

At this point, affordable vector graphic technology is limited to monochrome displays, and that is what is found in the Vectrex Arcade System. Color is provided by a device which Odyssey used on the very earliest video game systems, namely translucent plastic overlays which pop in front of the screen. In some cases (Mine Storm, Berzerk, and Clean Sweep) these displays are all one color, while in other games up to three colors are found on the overlays.

On most self-contained game systems, sound is provided by a series of electronic boops and beeps and buzzes. Not so on the Vectrex system. The sound rivals that of the best computer and coin-op games and, in several cases, even includes music.

So the hardware is impressive; what about the games?

## Mine Storm

Mine Storm is an adaptation of, dare we say it, Asteroids Deluxe. The game is built into the basic Vectrex system, and it automatically appears upon power-up.

You start with a small space ship at the center of the screen. Yes, a ship, not a simple triangular representation. The detail has to be seen to be believed! The joystick control is used to rotate the ship while three buttons are used to fire your weapon, provide forward thrust, and escape to a different part of the screen. The object of the game is to navigate safely through a field of space mines, alien ships and saucers, and other nasty objects.

The first level of play is relatively straightforward. Each time you hit a large object it divides into two medium-size objects. A hit on a medium-size object divides it yet again into small space ships. A hit on one of these ships destroys it.

Every once in a while, a flying saucer appears; this can be destroyed for bonus points. For the most part, we found you can get through level one by simply sitting in the center and rotating and firing in the directon of the approaching ships, saucers, and other objects.

After clearing the board, level 2 commences. Unlike level 1, on this level the ships start firing back and homing in on you. Quick reflexes on the thruster and escape buttons are needed to survive. We found the same strategy works here as on the Asteroids Deluxe arcade game, namely going to one of the four corners and firing into the corner. Because of screen wraparound, this effectively increases your rate and area of fire since the shots, when they leave the corner, reappear in all three of the other corners.

The responsiveness of your ship to the controls is excellent, and the graphics and the sound effects are simply magnificent. If you like Asteroids Deluxe in the arcades and have been disappointed with some of the home versions, you have a treat in store with Mine Storm.

## Berzerk

As in the arcade game, the object of Berzerk is to guide your humanoid through a series of rooms and corridors guarded by robots. On each screen you get bonus points for eliminating all of the guards and exiting through a door on the opposite side from which you entered. You can eliminate guards by shooting at them (for this the joystick provides a choice of eight directions) or by causing them to walk into one another or into the electrified walls of the maze. But whatever your strategy, you must execute it quickly and flawlessly before you get eaten by Evil Otto.

PLAYER
PLAYER
175
BERZERK
FIRE
FIRE
FIRE
FIRE

Evil Otto? Yes, he is a smiling creature who bounces from the top to the bottom of the screen slowly moving across it and eliminating everything in his path. When you hear the warning notes signalling the approach of Evil Otto, your best strategy is to make for the closest exit whether or not you have eliminated all the robot guards.

An exit from the top or bottom puts you in an awkward spot on the next screen for eliminating all the robot guards. This is especially true on the higher levels where the guards are no longer docile but shoot back at you.

The joystick controls your movement and the aiming of the laser in any of eight directions, while any of the four buttons fires your weapon. Berzerk can be played by one or two players.

## Scramble

Based on the arcade game, Scramble puts you at the controls of a speedy fighter plane flying from left to right across the screen. Actually, the plane does not move but the terrain and other objects scroll by from right to left. There are several distinct screens of obstacles. On the first, rockets take off. They can be shot with your laser cannon while targets on the ground (resembling, curiously, artist's easels) may be destroyed with bombs.

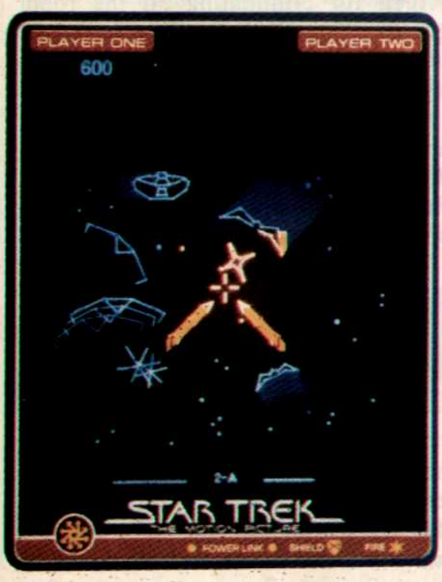
The terrain is mountainous and swooping down to bomb lower targets often results in trouble as you attempt to gain altitude to avoid the next batch of missiles.

On the second screen, you are assaulted by flying dishes (clumsy, ungainly saucers) which come flying at you from the right. If you dispatch them to alien heaven (don't forget the ground targets), you are faced with the third screen. On this screen, invulnerable flying wedges (doorstops?) assault you in waves from the right. They must be avoided; your laser cannon is useless. However, you can still drop bombs on the ground targets.

On the fourth screen your maneuvering space is cut drastically. As far as we know, nothing fires at you on this screen, although none of our play testers was able to get by it to the next one. Who knows what lies beyond? We certainly don't, but maybe you can find out.

## Star Trek

As might be expected, this is a shoot-'em-up game set in outer space. However, it is not based on the Star Trek computer game which has enjoyed popularity for so long. Rather, it is a simplified version of the Atari computer game, *Star Raiders,* without the navigation portion.



Although I achieve reasonable scores in *Star Raiders* (on the novice level), I found Star Trek quite impossible. Not so, my eleven-year-old son. He had no trouble navigating with one hand and using the other to control the buttons for firing, shields, and a power link (replenishes your ship when fire power or shield strength is low). I have no idea how his scores in the 16,000 range would hold up in real competition, but while he was playing I saw ships, aliens, and star bases that I could never hope to see while playing for scores of 1000 or 2000. I think he is hustling me, but Derek tells me this is one of his favorite games. Maybe it will be one of yours, too.

## HyperChase

HyperChase is a road race game in which you must guide an automobile down a twisty road past other cars and roadside obstacles. The pace can be leisurely or breathtaking; it is up to you. Steering is accomplished by simply moving the joystick right or left while the four buttons are used to upshift, downshift, brake, and accelerate.

Since I have only two coordinated fingers, I simply upshifted as soon as possible and then used the accelerator and brake to guide my progress through the course. This strategy, unfortunately, leads to lots of crashes (spectacular and noisy!) and times in excess of 200 seconds to complete the race. Younger, more accomplished players who were able to use the up and down shift, kept their cars intact and posted much better times for the race. The game is good fun and lots safer than racing my Fiat X1/9 on the streets of Morristown.

## Armor..Attack

As the name Armor..Attack implies, this is a game in which you maneuver a tank around various obstacles and attempt to shoot enemy tanks. There is also an enemy helicopter, shown on the Vectrex system with amazing realism both in sight (the blade turning) and sound (just like the real thing).

As in the Cinematronics arcade game, on which this is based, two buttons are used to rotate the tank right or left while the two other buttons are used to accelerate and fire. For players who prefer a joystick, this may be used in place of the right and left rotate buttons. To play the game successfully calls for a good seek and destroy strategy as well as skill in maneuvering and firing.

## Clean Sweep

Golly, gosh, a Pac-Man derivative. Whatever will they think of next? No, that's not fair. It would be unthinkable for the manufacturer of an arcade system like this not to have a maneuver-around-the-maze game. But there are some significant differences between Clean Sweep and Pac-Man; there have to be or GCE would be in court with Atari. The maze has four exits (top, bottom, and each side) through which your creature can go but your pursuers cannot. Also, your pursuers enter the board from one of the four side points rather than from the center.

The most important difference is that you have a limited capacity for eating the dots of the maze. When your capacity is reached, signalled by a growth in your size and an audible warning, you must head for the center where you deposit your load and reap bonus points.

Four small rooms, one in each corner of the maze, act as power dots, and give you the capacity to eat your pursuers. Upon doing so, your body becomes quite bloated and you earn additional bonus points.

As with Pac-Man, Ladybug, and games of this ilk, Clean Sweep had high appeal for the female members of our playing panel.

Incidentally, since no buttons are used in the play of Clean Sweep, the joystick may be manipulated with either the right or left hand.

## Other Games

In addition to the seven games tested, GCE has announced an impressive lineup of games licensed from Cinematronics including Space Wars, Star Hawk, Rip-Off, and Solar Quest. Other original games include Blitz! (a football game) and Cosmic Chasm. All thirteen games retail for around $30. Retail price of the Vectrex Arcade System is $199. ■

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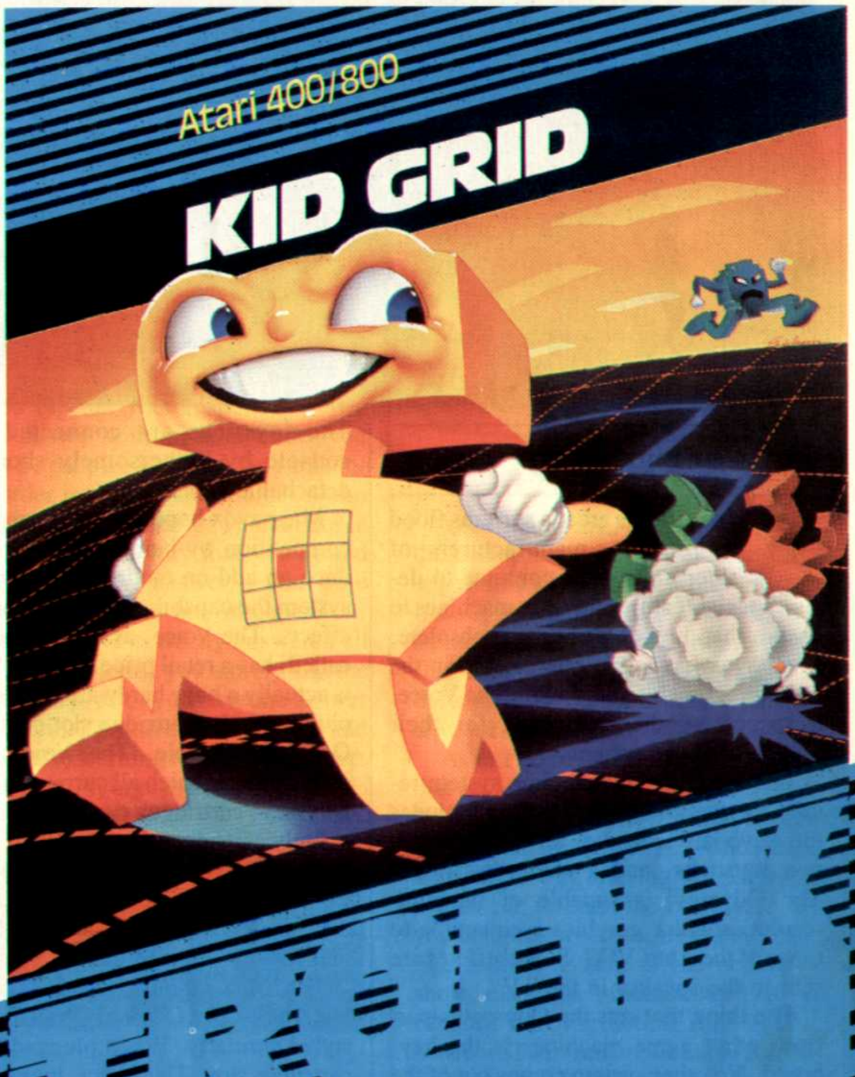


TRONIX

TRONIX

# THE VOICE OF ODYSSEY

THE VOICE
VOLUME
POWER
NUMERIC
FUNCTION
ALPHA

**By Owen Linzmayer**

As new home arcade systems flood the market, manufacturers of older units must continue to design special features for their machines to ensure that they don't become obsolete. Magnavox has taken a large step in the right direction by introducing The Voice, a speech synthesis module for their Odyssey$^2$ game system.

The Odyssey$^2$ video game system retails for just under $200. This includes the keyboard console, an AC adaptor, two joysticks, and a starter cartridge. The Odyssey$^2$ is capable of medium-resolution color graphics comparable to those of the Atari VCS. Sound effects are sent to the speaker in the TV.

The thing that sets the Odyssey$^2$ apart from other game machines is the keyboard. No other system comes out of the box with a built-in alphanumeric keyboard. There are 49 keys on the plastic covered membrane keyboard. Like the membrane keyboard of the Atari 400 personal computer, the Odyssey$^2$ keyboard offers no tactile response when a key is pressed.

In addition, the keyboard is recessed and thus difficult to type on. A touch typist would find the keyboard on the Odyssey$^2$ a nightmare, but for those who hunt-and-peck, there is no real problem.

The two eight-directional joysticks that come with the Odyssey$^2$ package have one action button each. The joysticks are switch type in nature. Their insides contain a flat pattern of switches that are pressure activated. These joysticks are not overly responsive to player control, indeed they seem a bit sluggish. The joysticks are connected to the console by bothersomely short, non-detachable cables.

Magnavox hopes to get a jump on the competition by being the first to introduce an add-on module that gives their system the capability of voice and sound effects. The Voice, as the component is called, has a retail price of about $100. It is actually a huge hardware cartridge that plugs into the cartridge slot of the main Odyssey$^2$ console. The Voice has its own slot into which all current and future Odyssey$^2$ cartridges can be inserted.

Only cartridges that are specifically in The Voice series make use of the special capabilities of the module. If a game doesn't require The Voice, sound effects will still come from the TV speaker.

The Voice module is made of the same material as the Odyssey$^2$ console and is styled similarly. When plugged into the cartridge slot, The Voice looks like an extension of the original unit. The module leaves the keyboard uncovered and allows for access to the on/off power switch.

The Voice has its own built-in speaker and volume control. The slot in The Voice is on a slight angle which makes inserting a cartridge seem incorrect, and there is no cover over this slot, a situation which could lead to dust build-up on the exposed connector.

The Voice comes complete with a new AC adaptor that is meant to replace the one that comes with the original system. There should be no compatibility problems with the adaptor as it has both male and female plugs.

If you have an Odyssey$^2$ and bought only The Voice, it would do nothing for your system. You must have at least one cartridge from the new Voice line. Cartridges currently available are: *Type and Tell, Nimble Numbers Ned,* and *K.C.'s Krazy Chase*. Magnavox plans to have four more cartridges available by the time you read this.

*Type and Tell* is basically a free-form program that lets you experiment with the voice capabilities of the module. Although the outside packaging might lead you to believe that there were four distinct games programmed into the cartridge, it really isn't so. The games mentioned are simply suggestions as to what you could do with the system. Most of these suggestions become readily apparent to the user after experimenting for a few minutes.

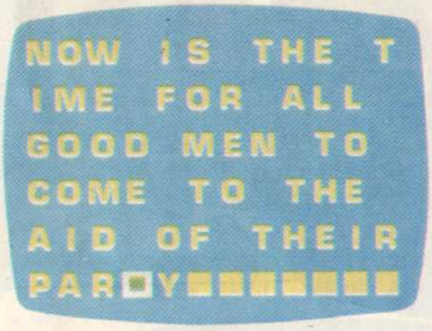
*Type and Tell* turns the screen into a 12 x 6 matrix of green blocks on a blue field. Each time you type an alphanumeric key, that character is drawn into the block and the cursor advances. When you are satisfied with the phrase that is on the screen, press the enter key and The Voice will do its stuff.

The program translates the information on the screen into voice patterns. Since the program is not smart enough to disallow them, having the computer try to pronounce nonexistent words can produce some funny results.

The program will attempt to vocalize anything you type onto the screen. To make things sound as correct as possible, you must often slaughter normal English spelling. For example: to properly pronounce "computer," you would type "come-pewter." Remember back in first grade when you were told to spell words exactly as they sounded? Well, it's the same here, only on a much more sophisticated (so fist ih k ted) level.

*Type and Tell* has no problem pronouncing the numerals zero through nine, however any number greater than nine must be treated as a normal word.

*Type and Tell* has limited text editing features that are used to manipulate the information that is currently on the screen. For $39.95, *Type and Tell* is a rather expensive cartridge for a game player. After all, how many prank phone calls can you make with The Voice before you become bored? The people at Magnavox would like us to think that there are many uses for *Type and Tell*. Unfortunately, few come to mind.


NOW IS THE T
IME FOR ALL
GOOD MEN TO
COME TO THE
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PAR▣Y

**Type and Tell.**

*Nimble Numbers Ned* is the first educational game cartridge designed specifically for use with The Voice. This program is a valuable learning tool as it combines math drills and an action game, making it more interesting for children.

The object of *NNN* is to cross a huge river by jumping 100 stones while avoiding rolling barrels. You don't get a chance to jump until you answer some mathematical questions, and the number of jumps is determined by the number of correct answers you give.

At the beginning of every session, Ned appears leaning on his barrels and asks which drill you would like to try. There are three different drills to choose from. They are: Shapes, Multiplication, and Functions.

After completing a drill, you return to Ned, who is now standing on a numbered rock. Barrels will roll at Ned from the right, and you use the joystick to jump them. As you advance across the river, The Voice taunts and coaches you with advice such as "watch out" and "dodge." Unfortunately, the things that it says do not correspond to what is happening on the screen.

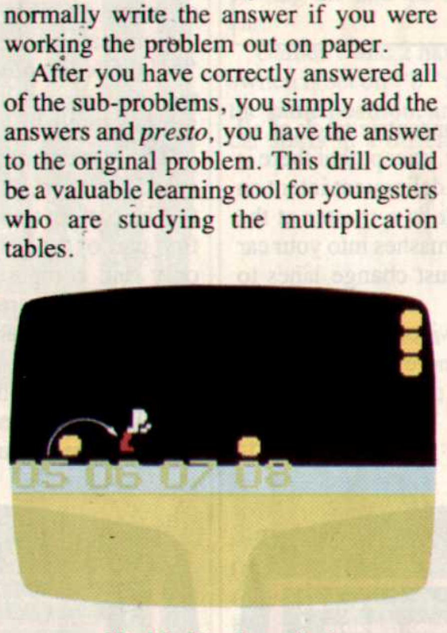
The first, and easiest of the three drill programs is called Shapes. The screen is filled with geometric shapes. The computer asks you to identify the single flashing shape. If you make a mistake, you are told what the correct answer is.

The difficulty levels merely indicate how many different figures are on the screen; this doesn't make it any harder to answer correctly. Shapes is a drill with limited usefulness, but that is not to say it is useless. To do well in geometry, you must have an understanding of the simple geometric shapes.

Multiplication, the second drill program, is harder than Shapes and is much more useful. The computer presents you with a multiplication problem, the complexity of which is based on the difficulty level chosen.

Instead of assuming that the user is a member of Mensa, the computer breaks the original problem down into several problems of manageable size. The Voice asks you the answer to the small problem and you type in your response. If you want to answer with the number 56, you type in 6, followed by 5. Using this reverse order is strange to those of us who were practically born with a calculator in hand, but it is the way that you would normally write the answer if you were working the problem out on paper.

After you have correctly answered all of the sub-problems, you simply add the answers and *presto,* you have the answer to the original problem. This drill could be a valuable learning tool for youngsters who are studying the multiplication tables.

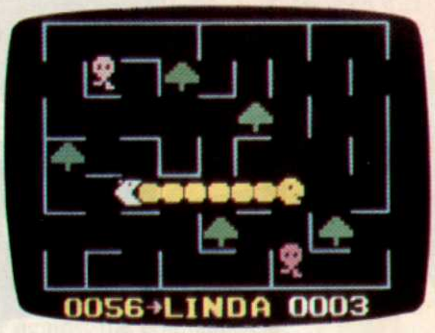


**Nimble Numbers Ned.**

The third drill is called Functions. This is the hardest of the three drills on the *Nimble Numbers Ned* cartridge. The computer presents an equation, part of which is masked over. You must determine what number is omitted by using basic algebraic skills.

*Nimble Numbers Ned* is a valuable educational drill package. There is a wide enough range on the difficulty scale to make it useful for grades 1 through 8. The advantage to having a computer generated math drill is that the computer can keep coming up with new problems, thus retaining a child's interest for extended periods of time. I hope parents who own an Odyssey² will seriously consider buying their children this cartridge if they feel that their math skills could use a little improvement.

*K.C.'s Krazy Chase* is the first talking arcade game for the Odyssey. *Chase* is a maze game in the Pac-Man tradition; you run through a maze, chomping on dots while avoiding predatory monsters.



**K.C.'s Krazy Chase.**

Your character, K.C., is not alone in the maze; there are two monsters and a segmented snake to keep him company. If K.C. eats part of the snake's tail from behind, he can stun the monsters for a short time. When K.C. has eaten all of the segments that make up the snake, he advances to the next level.

As in Pac-Man, there are side tunnels that act as wrap-around hallways. *K.C.'s Krazy Chase* has five different mazes from which to choose. The Voice module is kept active by offering you playing tips as you run through the corridors. When you complete a screen, it laughs and, just like John Davidson of the popular TV show, exclaims "Incredible!" Remember, all cartridges that run with The Voice will still run on the standard Odyssey² system. Although *Chase* doesn't do anything really impressive with The Voice, at $34.95 it *is* a good buy.

Most people think twice before shelling out $100 for any piece of hardware. Keep this in mind: a peripheral similar to The Voice for a popular home computer, the Votrax Type 'N' Talk, sells for $249. The voice quality of The Voice is relatively good when you compare price tags. You can understand most common words the first time you hear it pronounce them.

If you are considering buying The Voice, ask a local dealer for a demonstration if at all possible. Then ask yourself whether voice capability is really that important to you. The Voice is an expensive module and should be bought only if you are serious about your Odyssey² game system. ■

# MASTERING THE ATARI VCS GAMES

By David H. Ahl and Martha Koppin

By Martha Koppin

## Dodge 'Em by Atari

### Game Description

The object of *Dodge 'Em* is to clear a concentric track of all the dots. This does not seem overly difficult, except that there is another car on the track driven by a juvenile delinquent intent on forcing you into a game of "chicken." He is a master at the game in that he never does chicken out; he smashes into your car every time. In order to stay alive, you must change lanes to avoid him.

After you clear the track of all dots twice, two computer controlled cars enter the track, making life more difficult. These cars move more slowly than the single car and seem to be less eager to smash up.

Each player is allowed three heats per game. The heat is ended when the cars crash or when the player runs over five sets of dots, whichever is first (usually the crash!). Because of the limited number of sets allowed per game, the maximum number of points possible per game is 1080.

Fortunately, the delinquent has very little imagination in the "b" difficulty position (which is the easier) and always makes the same moves in the same situation. Thus, a pattern can be followed which will afford success almost every time.

The movement pattern must be coupled with the appropriate speed variation, as you must be in the right place at the right time for the pattern to work. Figure 1 is a sketch of the track and the first part of the Pattern A (which should be used for tracks with only one computer car with the difficulty switch on "b"). Where the dots are close together, the accelerator is depressed. Where the dots are spaced farther apart, the car is coasting. Again, it is important to press and release the accelerator at exactly the right point in the track to avoid being smashed.

Following patterns 1 through 5 will generally carry you past the first three boards. From there on, you are on your own.

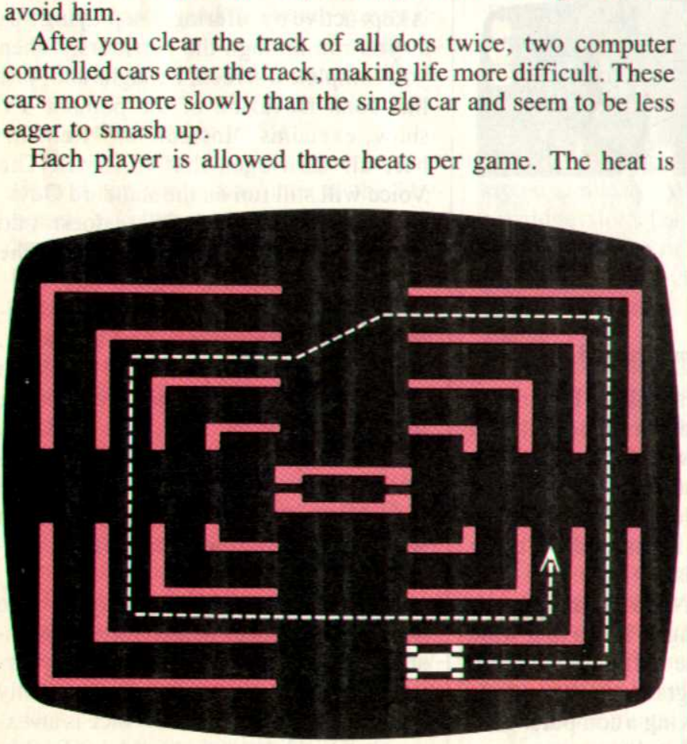


Figure 1: Pattern to avoid one computer-controlled car (1).
------ = Accelerate

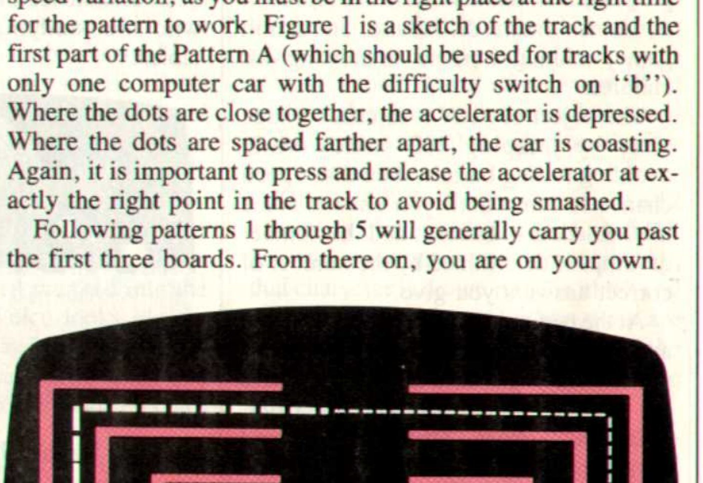


Figure 2: Pattern to avoid one computer-controlled car (2).
------ = Accelerate
▬ ▬ ▬ = Slow Speed

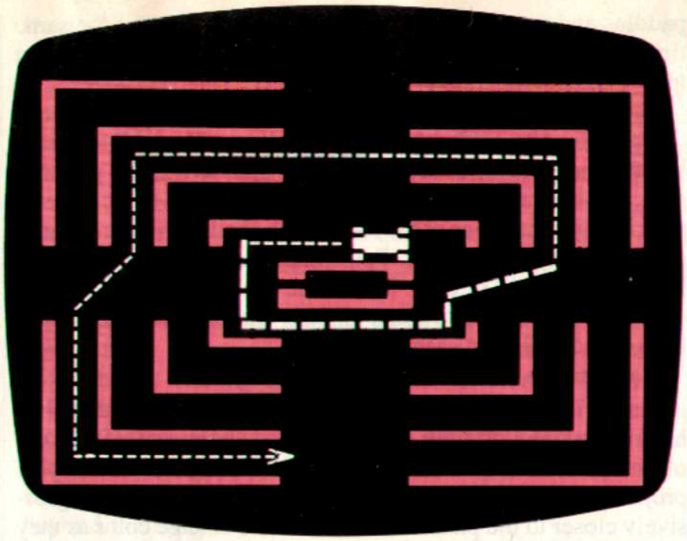


Figure 3: Pattern to avoid one computer-controlled car (3).

------ = Accelerate

▬ ▬ ▬ = Slow Speed

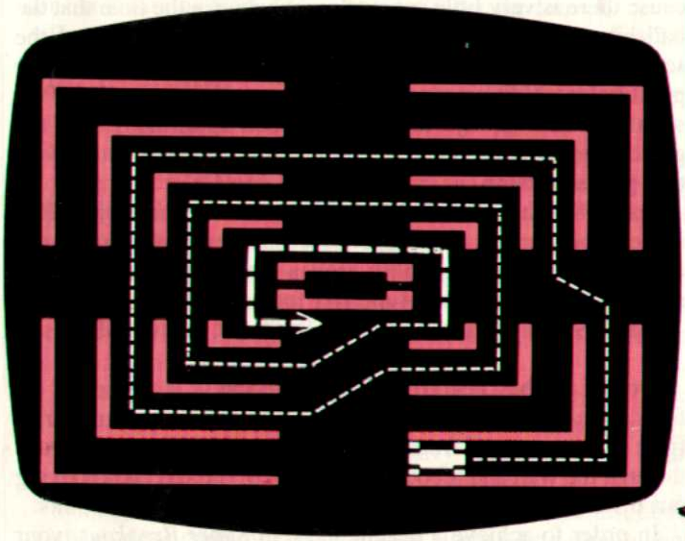


Figure 4: Pattern to avoid two computer-controlled cars (1).

------ = Accelerate

▬ ▬ ▬ = Slow Speed

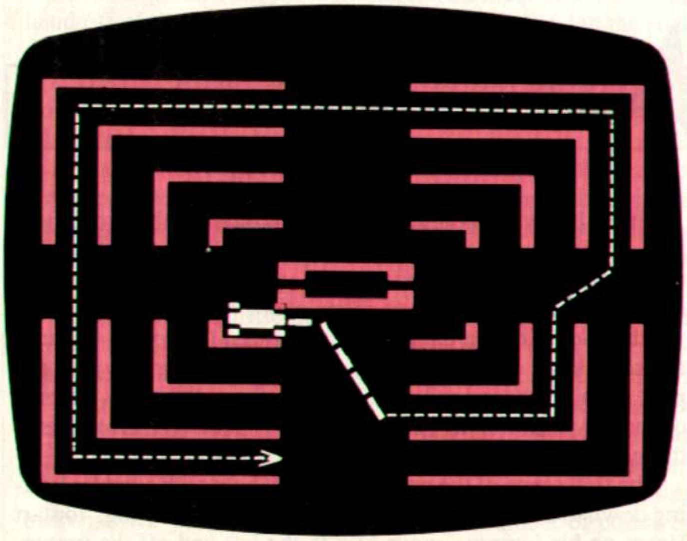


Figure 5: Pattern to avoid two computer-controlled cars (2).

------ = Accelerate

▬ ▬ ▬ = Slow Speed

### Controllers

Your car automatically moves forward around the track. To change lanes, move your controller up, down, left or right. Remember that you are not in the car, steering left when you want to make a left turn, but rather you are above the track, moving you car relative to the track. When you are on the upper part of the track you move your controller up to move to the outside lane, rather than moving it left to move left into the lane. This takes some getting used to but soon becomes automatic.

The accelerator of your car is the red button on the joystick. The most important feature of the accelerator is that when it is depressed the car can change only one lane in either direction. If the car is moving at a more leisurely pace it can (and will, often when you don't want it too) switch two lanes. One of the primary functions of the accelerator, therefore, is to give you more control of the car.

### Scoring

There are 80 dots on the track, each of which is worth one point as your car runs over it. Each time you clear the track of all dots, a new set appears and you are awarded 8 bonus points.

### Variations

Game 1: One player against the computer car.

Game 2: Two players alternating turns against the computer car.

Game 3: Two players, alternating control of the point-scoring car and the crash car. There is no computer controlled car.

Games 1 and 2 have two difficulty levels: when the difficulty switch is set on "b" the computer controlled car always starts in the same position, and when the switch is on "a" the computer car starts in a different position each time.

**By Martha Koppin**

## Super Breakout by Atari

### Game Description

The object of *Super Breakout* is to demolish rows of colored (assuming, of course, that you have a color TV) bricks. Each time you hit a brick with the ball, you score the appropriate number of points and the brick disappears.

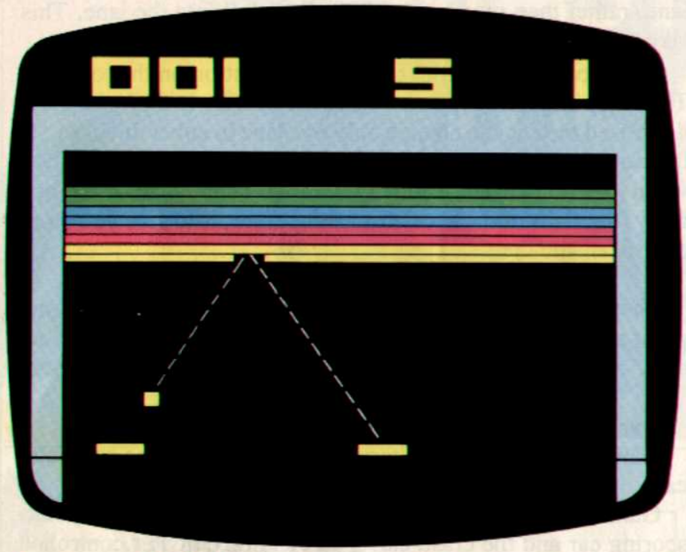
Hitting the wall in the same place each time results in breaking a path through it. Once the ball breaks through the wall, it rebounds against the top of the wall and the top of the screen knocking out bricks until it breaks back through to the bottom of the wall. Obviously, this scores a good number of points.

It seems to be easier to concentrate on breaking a path through the extreme right- or left-hand corners of the wall. Shooting for the middle usually results in clearing the entire first two rows before breaking through.

The bad news about breaking through is that when it happens the paddle is immediately reduced to half its original size, making it more difficult to keep the ball in play. However, with a little more concentration and a finer touch on the paddle controller the wall can be totally demolished.

The key to hitting the ball back consistently is anticipating where it will hit the bottom of the screen. If you wait to see where it's going to land, you'll get there too late to catch it.

After the first wall is taken care of, for a total of 416 points, a second one appears. No credit is given for the elimination of a wall; the point values remain the same and no extra balls are awarded. The first time I made it through a wall, I was extremely disappointed to find that there was no fanfare or reward—just more work!



**For success in Breakout, you must anticipate how the ball will rebound.**

### Controllers

You move your paddle left and right at the bottom of the screen. The speed of the video paddle is not limited, as in some games; it moves at the same rate as the paddle controller. The red button on the controller serves the ball to start each turn.

The video paddle is divided into four sections. Each section has a different rebound angle, so you can anticipate where the ball will go. However, the rebound angle becomes sharper after the eighth hit, then less sharp again after the sixteenth hit. After the forty-eighth hit the paddle is divided into only two sections, with each rebound angle being about 45 degrees.

You will have to gain a fair amount of expertise to make use of this information about the angles. At first, it will take all of your coordination just to get the paddle to hit the ball, never mind at what spot on the paddle. Also, attempting to hit the ball at the edge of the paddle often results in missing it altogether.

The speed of the ball is not controllable, but does increase after the eighth hit and as the ball knocks out one of the bricks in the top four rows of the wall.

### Scoring

Each wall of bricks contains eight rows. Each time a brick is knocked out of the first or second row, the player scores one point. Bricks are worth three points in the third and forth rows, five points in the fifth and sixth rows, and seven points in the seventh and eighth rows.

The only exception to this is in the game variations that have more than one ball in play at a time. In these games, the point values are multiplied by the number of balls in play.

### Variations

Game 1: Basic one-player game.

Game 2: Basic game for two players. Each player receives his own wall of bricks and the turns alternate. A turn ends when someone misses a ball.

Game 3: Double Breakout for one player. You receive two paddles and two balls. When two balls are in play at the same time, point values are double. The paddles are stacked one on top of the other.

Game 4: Double Breakout for two players.

Game 5: Cavity Breakout for one player. The wall of bricks has two holes in it, each containing a ball. When the play begins, it looks rather like a face with two maniacal eyes. When a path is broken into one of the cavities, the ball within is released, putting two balls into play. Point values are doubled as long as both balls remain in play. When one ball is missed, the point values revert to their original amount and play continues until the second ball is missed.

Game 6: Cavity Breakout for two players.

Game 7: Progressive Breakout for one player. Rather than having one wall of eight rows of bricks, Progressive Breakout offers two walls, each of which contains four rows. As the play progresses, these rows move down the screen, getting progressively closer to the paddle. Since the rows change color as they move down the screen, their point value lessens. Threfore, it is to your advantage to break through as soon as possible to hit the uppermost bricks. The very low bricks present a problem because there is very little room to react between the time that the ball hits the brick and the time it goes off the bottom of the screen. Apparently, if one of these low bricks is hit in its center point before it disappears, bonus points may be awarded. Personally, I have always been too wrapped up in the heat of the game to notice the score at this point. This game does not have a two-player version.

Game 8: Children's version of Breakout for one player. This is the same game as Game 1, except that the paddles do not decrease in size when the wall is broken through and the ball does not speed up when one of the last four rows is hit.

Game 9: Children's version of Breakout for two players.

### Comments

One of the best features of *Super Breakout* is the sound effects. The sound that a brick makes when it disappears varies from row to row and from game to game. When the ball breaks through the wall and rebounds at the top of the screen, knocking out brick after brick, the sound is more fun than the points.

In order to achieve a decent score in *Super Breakout,* your paddle controllers must be in perfect condition. Otherwise, the video paddle will wander a little, causing more misses than hits.

**By Martha Koppin**

## Pitfall by Activision

### Game Description

Pitfall Harry is an agile fellow with unbelievably good posture. His mission is to travel safely through the jungle collecting the "Lost Treasures of Enarc" (Yes, the name of the game designer is Crane—it sounds more exotic when spelled backwards). Some of the dangers awaiting him (Harry, not Crane) are scorpions, crocodiles, snakes, fires, quicksand, vanishing pits, open holes, and rolling logs. Since an encounter with most of these will kill Harry, Mr. Crane has sportingly given Harry three lives.

The first scene of the game includes a hole with a ladder leading down to the underground tunnel and a stationary log. To start Harry on his journey, move him to the left and off the screen. Moving to the right will immediately put Harry at a disadvantage, since all the rolling logs in the jungle roll from left to right.

It is easier for Harry to run with them than to try to jump over the approaching logs.

Harry's first obstacle is a pool of crocodiles over which hangs a swinging vine. He must use the vine to clear the pool and continue on to the next scene. One important note about swinging vines: they are included in a scene for a reason, so use them. Even when the scene seems safe, if you wait a second at the edge of the screen, a vanishing pit or quicksand bog will inevitably appear. This is especially true in the scenes containing treasures.

The prize is always at the edge of a quicksand bog, so if Harry goes rushing in he may be swallowed up just at his moment of glory. If you find that Harry got a late start in running across a scene between quicksand appearances, you might try pressing the red button at the very second that it starts to reappear (while Harry is running). With a little luck, Harry will be in mid-air when it opens up under him and his momentun will carry him beyond the danger.

Under each scene runs a subterranean tunnel with either a ladder connecting it to the surface or a scorpion patrolling below. The scorpion follows Harry's movements from below, but cannot harm him as long as he does not enter the tunnel.

Harry must jump over fires and snakes ("cobra-rattlers"—apparently Mr. Crane's knowledge of herpetology is limited). If he touches either of these he will die instantly; they are not hard to jump, however.

Rolling logs are annoying but not fatal. Since they roll in the same direction (if Harry is running left) and at the same speed as Harry, he will not have too much trouble avoiding them. Touching even stationary logs cost points.

The hardest thing Harry has to do is jump over a pool of crocodiles without a vine. He must hop from one to the next while their mouths are closed. This is possible, but requires concentration and coordination on your part.

To start this maneuver, you must first watch the crocodiles open and close their mouths until you get a feel for how long they keep them open. Now move Harry about two steps to the right of the pool.

When you are ready, wait until the crocodiles are just about ready to close their mouths and make Harry take a running hop to the first one. If you have timed this right, the crocodile should have his mouth shut, if not, you can only bid adieu to Harry.

Assuming that Harry is still okay, you must now take your hand off of the joystick for a split second and then tap the stick and press the button simultaneously to make Harry hop to the next croc. Repeat this until he gets to the other side of the pool. You must do this without any delay between taps. Remember what they say about he who hesitates . . .

It would seem better to hold the joystick and press the red button three times, making Harry skip across the crocodiles' heads quickly. It doesn't work. Holding the stick while you press the button makes Harry's jump too long and he ends up falling into the water between the crocodiles.

Croc hopping is difficult, but, unfortunately, necessary to get a decent score; all of the treasures are on the other side. One small consolation is that if Harry does get eaten, his replacement falls from the trees on the left side of the screen (on the other side of the crocodile pool, since Harry is moving to the left) and can thus continue on his way until the next set of crocs appears.

Once you have mastered the various techniques of crossing each hazard, you can amass a respectable number of points by simply running Harry at top speed through the jungle. However, in the jungle as in life, the big money is in the big risks.

To achieve the maximum score, you must make use of the underground tunnels. Each tunnel covered cuts off two or more surface scenes. Therefore, going below ground can be a useful shortcut to eliminate unproductive or dangerous scenes. However, taking the wrong short-cut can cause Harry to miss a treasure.

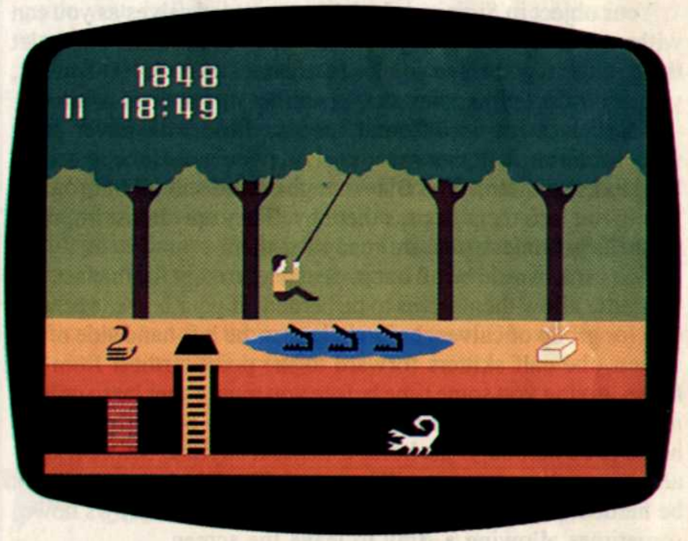
In order for Harry to take the most efficient and productive route through the jungle in the allotted 20 minutes, he must have a map. To make the map, you will need to write down the number of each scene and a short note about its contents, noting especially the location of ladders, brick walls, and treasures. You will need to get as many of the 256 scenes in the game as possible covered by going left. However, since time will run out before Harry returns to his starting point, you will have to repeat the procedure going right (by now Harry should be proficient enough to swing through the jungle in both directions).

This time start numbering the scenes at 256 and go down until the two lists meet. By checking which frames the various tunnels eliminate you should be able to figure out when to go below and when to continue above ground. In any case, speed is of the essence.

The major hazard in the tunnels is the scorpions. They are very difficult to jump, and if Harry's timing is not exact he will lose a life.

*Pitfall* is an imaginative game which is particularly appealing to those who do not like the pressure and confusion of the more fast-moving Atari games. Fast reflexes are not of major importance in *Pitfall,* but concentration and precise timing are.

The adventure is challenging, but won't give you an ulcer. Since there is an upper limit to the number of points available, eventually you may achieve a perfect score and therefore beat the game. However, the process involved in reaching that score will give you many entertaining hours.



I was somewhat disappointed in the lack of variety of the treasures and dangers. There are only seven different scenes, and the game could have been greatly improved by the addition of some surprises. However, since I do not know the programming limitations involved, I will not criticize.

**Controllers**

Pressure on the joystick to the left or right causes Harry to run in the corresponding direction. Pressing the red button causes him to leap with the grace of Rudolph Nureyev. By combining these two movements, Harry can achieve the running leap necessary to clear large obstacles.

To make Harry carefully descend the ladder leading to the subterranean tunnels, you must use a diagonal movement on the joystick, pressing down and to the left or right. A straight horizontal movement will result in Harry making a very fast and costly descent.

To make Harry grab a swinging vine, move the joystick in the proper direction and press the red button. If Harry hits the vine, he will latch on and continue to swing back and forth until you make him let go. This is done by pressing the joystick down. However, the safest dismount is achieved by using a diagonal movement, which makes Harry swing out farther, clearing the danger by a greater margin.

### Scoring

Harry starts his adventure with 2000 points, but loses some each time he has an accident (falling down the ladder, for example, costs 100 points). He is allowed to continue his journey even after he has lost all of his points, and will never show a negative score. More significantly, points are gained each time Harry successfully locates a treasure.

The treasure values are: Diamond Ring—5000 points; Gold Bar—4000 points; Silver Bar—3000 points; Bag of Money—2000 points. There are several of each kind of treasure in the game.

There is a time limit of 20 minutes on this game. The time remaining is displayed in the upper left of the screen, under Harry's score.

By Martha Koppin

## Stampede by Activision

### Game Description

Your object in *Stampede* is to lasso as many calves as you can without letting too many get behind you. You are allowed to let three of them go before you lose the game. At each 1000 points, you are awarded another stray, with an upper limit of nine.

The calves run at different speeds, those with lower point values running at higher speeds (giving you more time to get behind to lasso them). The Black Angus stand still all but forcing you to run into them or pass them by. They are almost impossible to lasso unless you are ready for them.

The game would be all but impossible, except for the fact that the cattle allow themselves to be herded. If your horse touches a calf (or group of calves) before it leaves the left-hand side of the screen, the calf skitters forward to the point farthest from the horse, giving you some time before you must either lasso or herd it again. The calf does not actually have to be in front of the horse to be herded; if the horse touches it anytime before it actually leaves the screen, it will be saved. The Black Angus cannot be herded; if the horse hits one, he rears back and slows down, sometimes allowing a stray to leave the screen.

True to the theme, there are also old cattle skulls on the trail which present a hazard to your horse. If you attempt to ride over one, your horse will rear and again lose time.

To lasso successfully, the loop must touch a calf. If you throw too soon, not only will you miss, but the time it takes to re-coil your rope may make it difficult to try again at a more appropriate distance.

The calves and obstacles move in six horizontal lanes, and only one variety will be in the lane at any one time.

To keep from losing a calf and keep the game going, it is important to keep the slow-moving cattle (harder to lasso or herd) to a manageable number.

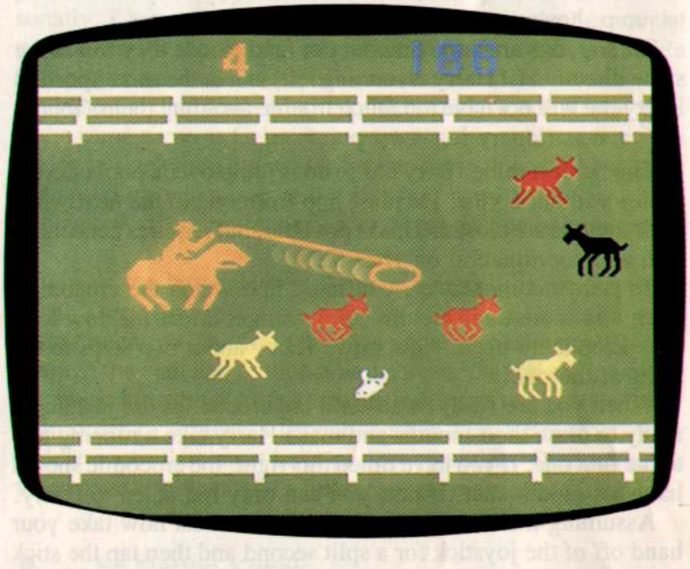
The horse will only move so fast up and down the screen. Thus it is impossible to get behind a calf at the top of the screen to lasso it and then get down to the bottom to catch a slow-moving one.

At first, the calves move slowly enough that it is fairly easy to lasso them all. Therefore, the strategy is to catch all but the red Herefords. At this point, they will all be moving only slightly slower than the horse and can be easily herded. If two lanes of cattle appear to be nearing the left-hand side of the screen at the same time, herd both lanes, rather than try to lasso them. You can get them later.

When the screen is filled with only Herefords, herd all but one lane to the far right of the screen and lasso the Herefords in the remaining lane. Stay put for an instant, as the next thing to appear in that lane will be either a skull (dodge out of its way) or a Black Angus (lasso it). Next will come a couple of Jerseys and then some Guernseys. More Herefords will follow the Guernseys.

If you keep all but one or two lanes in Herefords, you should be able to herd the Herefords and lasso the calves in the chosen lane(s).

Each time a calf is lassoed or gets past you, the next type of calf in the sequence will appear. When the Herefords appear again in the chosen lane(s), move on to a different lane, so that one particular animal does not stay on the screen too long.



A skull appears after the first lane of Herefords is cleared. The next lane cleared of Herefords will be followed by an Angus. The skull and Angus alternate for the rest of the game, but it is sometimes difficult to keep track of which went before.

To keep the herd in order, keep any Hereford lanes together in an almost vertical line on the screen. This way, you can make just one pass up or down to herd them all back to the right-hand side.

Be careful about letting calves get past you, because it will mess up your carefully managed herd, possibly creating two non-adjacent lanes with the slow animals forcing you to run feverishly from top to bottom on the screen.

After you get the feel of things, try clearing out more than one or two adjacent lanes of Herefords, especially early in the game. The calves become less willing to be herded after they have been stepped on several times; lassoing two or three lanes at a time means that you can clear out all of the old, stubborn Herefords more quickly.

When working with several lanes, each containing groups of two or three, it is sometimes beneficial to eliminate all but the front ones on each lane first. Then take care of those single calves, so that the next wave of calves come out all together.

### Controllers

The joystick moves the horse up and down on the screen; he cannot be moved forward or back. Presumably he is not responsive to giddap or whoa! Pressing the red button causes the cowboy to throw his rope. The horse will not move in any direction until the rope returns to the cowboy.

### Scoring

Points are amassed by roping the cattle encountered on the trail. The dark red ones are Herefords, worth 3 points. The brown ones are Guernseys, worth 15 points. The tan ones are Jerseys, worth 25 points, and the black ones are Black Angus, worth 100 points.

### Variations

Game 1: Basic game with calves starting out at a leisurely pace. The speed increases as the game progresses.

Game 2: Basic game, except that the calves move slightly up or down to avoid being lassoed. These calves are practiced in the art of vertical evasion, and this movement is no real problem.

Game 3: Same as Game 1, except that calves do not appear in their set pattern. One pointer: in some lanes several skulls alternate with Black Angus before giving way to other animals. Therefore, when you encounter a Black Angus, be ready for a skull and then another Black Angus. You can do your herding when the skull appears, getting back in place for the Black Angus.

Game 4: Same as Game 3, except that calves again try their vertical evasion tactics.

Games 5 through 8: Same as first four games, except that the speeds of the calves is faster from the start.

Setting the difficulty switch on "a" shortens the length of the rope, making lassoing all that much harder.

**By David H. Ahl**

## Room of Doom by CommaVid

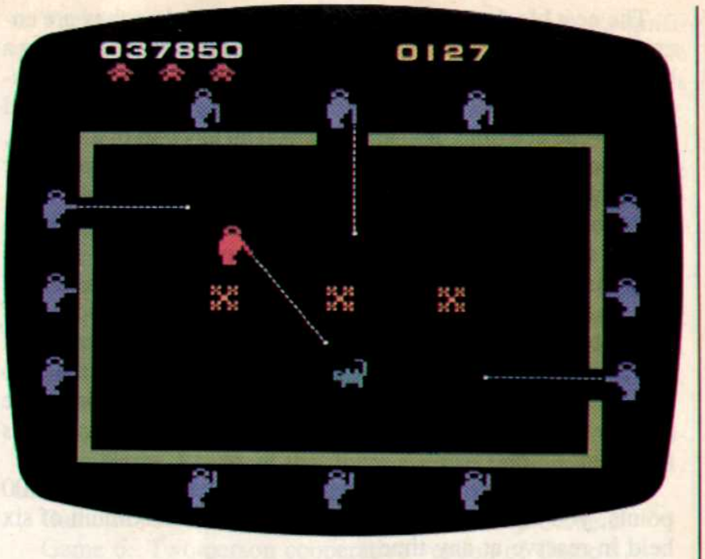
Your mind throbs, seeking a way out of the *Room of Doom*. Surrounding the room are fiendish gunmen concealed behind doorways. Slowly, their doors open and close thus allowing them to shoot at you. Not only that, these fiends have unleashed a hydra-headed monster which relentlessly pursues you about the room. But don't panic! Not yet, anyway.

As the doors concealing the gunmen open and close you can fire through them as well; each gunman you hit is worth 75 points. Furthermore, if you get close to the monster your gun will stun him for a few seconds; this is worth 50 points. However, should you remain in a room too long before eliminating the surrounding gunmen, the monster becomes invulnerable to your bullets.

You begin with a reserve force of three Doom Room players, shown at the top of the screen. Each time you eliminate all the gunmen surrounding a room, you move to an even more diabolical chamber and earn another player (up to a maximum of six).

Many rooms on the upper levels have deadly objects scattered through them. Even the slightest contact with either the monster or these objects spells doom.

*Room of Doom* has 64 different game variations, as well as four different starting rooms, for an almost endless variety of challenges. The following elements are the main variables:



1. Doors. Ordinarily, the doors blocking the gunmen periodically open and close, and the gunmen only fire when their doors are fully open. In the open door variation, the doors always open thus permitting the player and gunmen to shoot without warning at any time.
2. Diagonal Fire. The player can always fire diagonally as well as horizontally and vertically. Ordinarily, the gunmen fire only horizontally and vertically, but in the diagonal fire games they can shoot on the diagonal as well.
3. Speed. In the high-speed games everything happens twice as fast as in the normal speed game.
4. Guided bullets. Ordinarily, your bullets travel only in straight lines. However, in the guided bullet variations you can guide your bullets by moving the joystick in the direction you want the bullet to go.
5. Stationary fire. Ordinarily, you can fire only when standing still. In some variations you can fire only while moving.
6. Repeat fire. Although only one bullet can be on the screen at a time, ordinarily firing a bullet causes the previous one to vanish. In some variations, however, you can fire again only after your previous bullet has hit something. For the utmost challege in Games 49-64, you can fire a new bullet only after the previous bullet has hit something and you can fire only while moving.

Can you survive through all the Rooms of Doom? We haven't yet, but we are still trying.

**By Martha Koppin**

## Cosmic Swarm by CommaVid

### Game Description

*Cosmic Swarm* is really not complicated once you master the controls. You are piloting a tiny remote control probe ship into the power chamber of Waypoint, an "interstellar trade depot," which has been invaded by giant termites. The termites are building a nest within the power chamber and must be stopped before they completely jam it. (Somebody at CommaVid really has a wild imagination!)

What you see on the screen is a bunch of large bugs laying down blocks in a haphazard manner. If your ship touches one of the termites or one of the blocks, it is destroyed. If you fire on the termites, you can destroy them.

The nest blocks cannot be removed except when they are energized. To accomplish this, you must fire at a termite carrying a block and hit the block squarely on its bottom. If you are successful, all the blocks will turn red and can then be blasted away—one at a time. If at any time you hit any part of a termite, the blocks turn green, become de-energized and are no longer vulnerable.

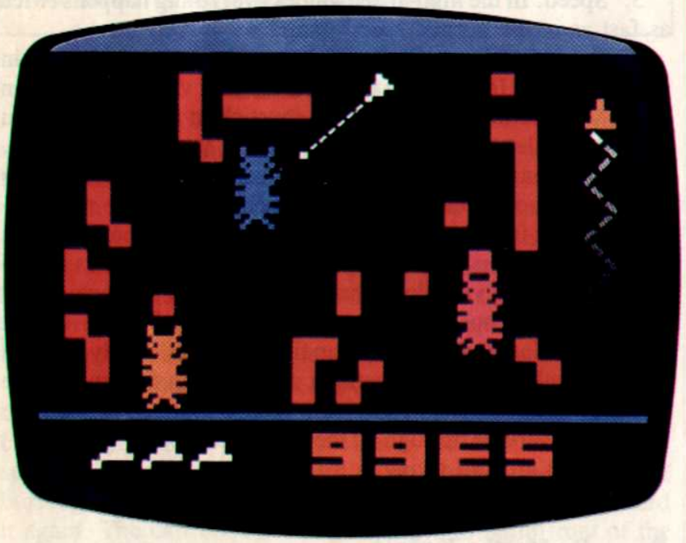
Periodically, you must refuel from a refueling ship which moves slowly down and then up one side of the screen. There is a warning sound before it appears, and since it travels so slowly, there is usually no problem in getting to it before it disappears. If you should miss the refueling ship, the game ends. Actually, I found it much more difficult to keep from shooting the ship since it was on the screen for such a long time and my shots were not always entirely accurate. Shooting the refueling ship results in instant defeat.

To start, you have three extra probe ships, and after every 100 points, you are awarded another ship, with a maximum of six held in reserve at any time.

### Controllers

Mastering control of the probe ship is no easy task. The various movements are described in detail in the instruction booklet. Basically, the ship is thrust in various directions when the joystick is moved left, right or diagonally without the red button being depressed.

With the button down, these same joystick movements cause the ship to rotate to the left or right. When the button is released, the gun is fired.



The problem, then, lies in trying to fire and move at the same time. Since just directing the ship requires so much coordination (rather like rubbing your stomach and patting your head) it is wise to fire only when it is standing still. It is possible to fire on the run in certain directions, but usually the ship ends up spinning around firing aimlessly.

As a beginner, forget about shooting the termites at all for the first several games; just practice getting control of the ship.

*Cosmic Swarm* has four skill levels controlled by the difficulty switches. The left switch controls the speed of the termites and the right controls their aggressiveness. By combining the settings of the two switches, you can select the best level for you. Setting both switches on "b" gives a beginner level.

### Scoring

You are not going to score 999,999 on *Cosmic Swarm*. The points available are as follows: 1 point for hitting a termite without a block; 2 points for hitting a termite carrying a block; 1 extra point if you hit the block on the bottom; 1 point for hitting an energized (red) block.

At generally one point per shot, you will really work for your extra ships!

### Comments

Since the controller action is so different from most of the other Atari games, this one is interesting and offers a challenge.

**By Martha Koppin**

## Worm War I by Fox Video Games

### Game Description

According to the manufacturer, your mission in *Worm War I* is to drive your tank through the city of Teriaki, blasting away as many worms and blocks as possible. We are not given any idea what these poor creatures have done to deserve this, since they have no aggressive tendencies whatsoever. They do not shoot, eat, bite, blast or in any way plot the demise of your tank. Their only sin is to crawl thoughtlessly in front of your tank, causing you to lose fuel. Perhaps this happens because the pavement becomes slippery with the mashed bodies, and traction is lost. At any rate, the worms simply crawl from side to side on the screen as your tank approaches, and you try to eradicate them and their city.

This does not sound too hard, and indeed, it is not; this is one of the less frustrating games for the Atari VCS.

Your tank starts with 99 units of fuel. The length of time you have to blast the worms depends on how long your fuel lasts. Collisions are very hard on your mileage. Each time you run into a worm you lose 10 fuel units; running into a block costs 5. The amount of fuel remaining is shown on the screen, right below your score.

The simple running of the tank also uses fuel, and the faster you go, the faster you consume it. The walls on either side of the screen are broken into segments, and each time your tank passes one segment a unit of fuel is consumed.

Since you have unlimited ammunition and limited fuel, it is to your advantage to keep the fire button depressed, more or less strafing the whole screen. The few worms that are able to sneak between bullets will probably be taken care of the next time they cross the range. Continuous fire also allows you to knock out quite a few blocks, as you move from side to side.

You have opportunities to stop for fuel during your rampage through the city. Periodically, a Pagoda Gas Station appears on the screen and you can drive through it to replenish your supply. Your tank can hold only 99 units, but the amount of fuel you take on depends on how fast you drive through the station. The slower you go, the less fuel you get (don't ask me why).

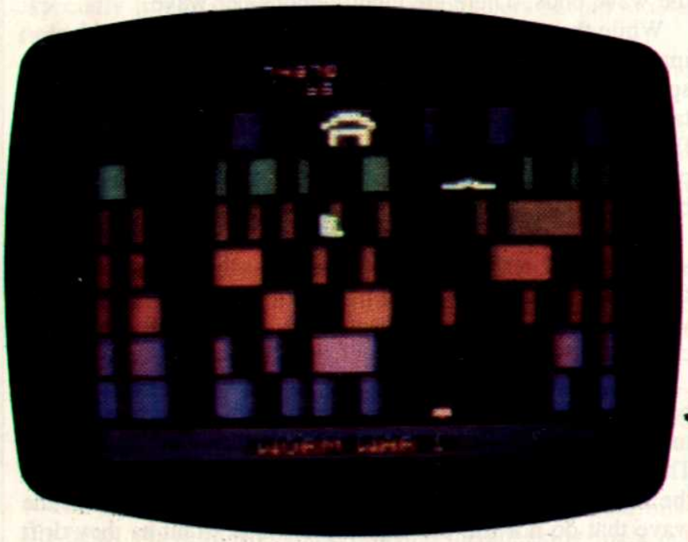
Since you get only a certain amount of fuel each time, and do not necessarily fill the tank, eventually you find yourself out of gas. Thus, the game ends.

It is to your advantage to obliterate everything on the screen (except the gas stations), so keep the joystick pulled back to give you as much time as possible. If you are getting a little low on gas, concentrate on eliminating the worms first. After each screen of worms is gone, a new set appears, and sometimes a gas station with it.

If you let a worm get past you to the bottom of the screen, he soon reappears at the top. If a gas station gets past you, it turns into a worm at the top; you don't get a second chance to refuel at that particular station. If you cannot make it through a particular gas station because of blocks, it is better to blast it than to let it get by.

When a gas station is blasted, the whole screen blows up. You are awarded no points, but you also lose no fuel and the screen is again clear of obstacles for a short time. It can pay to blast a station when your gas supply is in the 90s, and the screen is getting congested with blocks. A clear screen gives you time to get a head start on the oncoming blocks and worms.

Do not start to fire before you determine which of the blurry images are turning into worms and which are gas stations. You might inadvertently blow up a gas station just when you need it most.



The far edges of the screen are safe from collisions, so if you find a worm fast approaching you, beat feet for the edge. You can stay there indefinitely, but you do use up fuel, and you must clear away worms for the gas stations to appear.

The gas stations often appear nestled in a cluster of blocks. You must fire single shots very carefully to avoid blowing up the Pagoda. If you can clear just enough away to allow you access to a small portion of the Pagoda, you will still be able to refuel. This is tricky business, so keep the tank going as slowly as possible until the gas station is clear; then get your speed up to get as much fuel as possible as you sail through.

### Controllers

The joystick moves your tank horizontally across the bottom of the screen. Moving the stick forward speeds the tank up (actually, the tank remains at the bottom of the screen, but the obstacles and worms approach faster). Pulling back on the stick is the braking action for the tank, slowing it almost (but never entirely) to a stop. The red button is the fire button; press each time you wish to shoot, or hold it down for continuous fire.

The right difficulty switch controls the braking action of the tank. The "b" setting allows the tank to slow down to almost a stop, while "a" allows the tank to slow down only a little when the stick is pulled back.

The left difficulty switch controls the movement of the worms. With the setting on "b," the worms move in a consistent pattern from one side of the screen to the other; they move randomly on setting "a."

### Scoring

Each time you shoot a worm, you score a set number of points. The easier ones in the first group are worth 20 points, with each successive group becoming more valuable. There are also bonus points awarded each time you clear a group of worms.

The obstacles are worth 5 points apiece. This is not insignificant, since as the game progresses, many blocks can be visible on the screen at one time, allowing for a good number of points to be gained before you even begin to take care of the worms.

### Game Variations

Game 1: Basic one-person game as described above. The first set of worms starts out on a clear screen, but after this the obstacles appear.

Game 2: One-person game with no obstacles.

Game 3: One-person game with the same details as Game 1, except that the worms are invisible. This is not as difficult as it sounds, since you are firing continuously at the blocks anyway. Sooner or later worms are likely to crawl into your line of fire, invisible or not.

Game 4: Two-person cooperative game having the same details as Game 1, except that there are two tanks and drivers, sharing fuel and points.

Game 5: Two-person cooperative version of Game 2.

Game 6: Two-person cooperative version of Game 3.

Game 7: Two-person competitive version of Game 1. There are two tanks, two drivers, and two sets of fuel and points.

Game 8: Two-person competitive version of Game 2.

Game 9: Two-person competitive version of Game 3.

**By Martha Koppin**

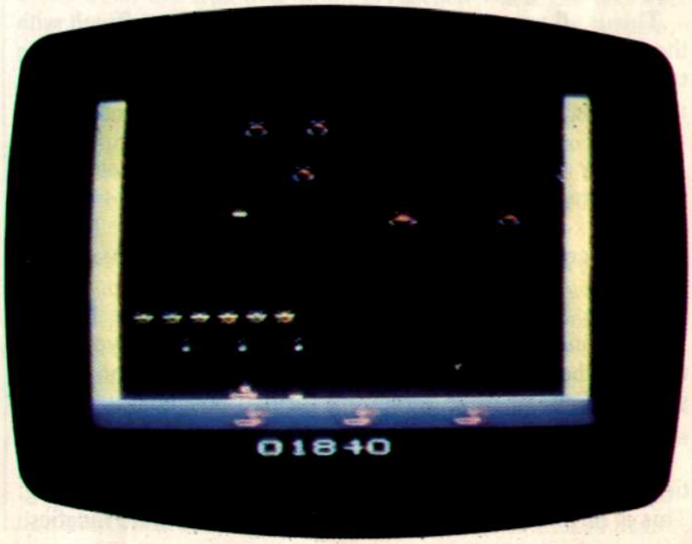
## Deadly Duck by Fox Video Games

### Game Description

The object in this game is for Deadly Duck to secure as many points as possible by shooting down crabs (flying crabs?) and falling bricks. As he does this, he must avoid hitting the dragonflies which are moving between him and the crabs. They cannot be destroyed, but when they are hit they drop bombs on Deadly, which he may or may not be able to avoid.

You begin with one duck on the screen and three spares, which are pictured below your score. Each time you clear a screen of crabs, you are awarded a spare duck. You are allowed an unlimited number of spares, but only three will ever be pictured on the screen.

During Level 1, try to shoot several of the crabs away so that you will be less confused as to which will drop the brick. Hopefully, this will enable you to shoot the bricks more consistently.



Try not to shoot away all the crabs, but practice shooting bricks without getting squashed.

Once you have mastered the technique of shooting bricks (try the shoot-and-run method), you can finish off the last of the crabs in Level 1. The two dragonflies make their entrance in Level 2, and run interference for the crabs. Try not to hit them; if you do, move away quickly so you won't be bombed. For only 10 points, it's not worth messing with the dragonflies.

As you progress to various levels, the dragonflies become more numerous and things generally move faster.

### Controllers

Deadly duck is moved back and forth across the screen by pushing the joystick in the appropriate direction. The red button causes the duck to fire, although it looks more like Deadly is spitting (could that be what is known as spitfire?) at the crabs above him.

### Scoring

Each time Deadly kills one of the crabs, he gets 30 points. When he wings a dragonfly, he gets 10. (Dragonflies cannot be killed.) For shooting a brick in mid-air during Level 1, 50 points are awarded. For the same shot in Level 2, 100 points are awarded, and for Levels 3 and 4, 200 and 500 points, respectively.

### Game Variations

Each of the four games of *Deadly Duck* is simply the basic game, but starting at a different skill level. Therefore, if you can stay in Game 1 long enough, you will eventually pass through Game 4. This is great for practicing at the higher levels without having to go through all the beginning stages.

Game 1: Beginner level—Starts with no dragonflies.
Game 2: Level 2—Starts with two dragonflies.
Game 3: Level 3—Starts with four dragonflies.
Game 4: Level 4—Starts with six dragonflies.

**By Martha Koppin**

## Skeet Shoot by Apollo

### Game Description

In *Skeet Shoot,* you have a skeet shooter, a target launcher, and targets. Each time a target is launched, you must point the gun in the proper direction and shoot so that the shot will intercept the clay pigeon.

This is all very straightforward and not terribly difficult with the skill switch set on "a." With the switch set on "b," the targets move much faster and the game becomes almost impossible.

### Controllers

The joystick controls the direction in which the shooter's gun points. Press the red button to fire.

### Scoring

There are 25 targets per game, each of which is worth one point.

### Game Variations

There are 17 variations of the basic game, allowing you to determine the direction of the target and the position of the shooter. Four of these games are for two people.

### Comments

There is a skill to be developed in Skeet Shoot, with fast reactions being an absolute necessity in the more difficult setting. This is obviously not a game for the space adventure fanatics.

**By Martha Koppin**

## Demon Attack by Imagic

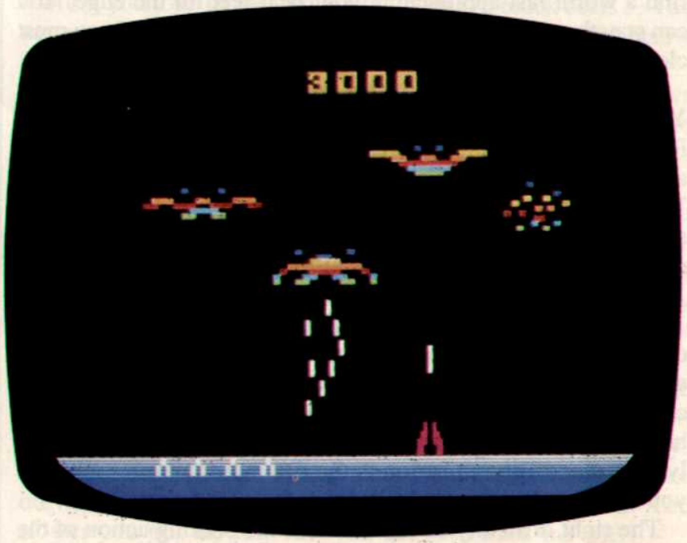
### Game Description

In *Demon Attack,* your missile base is at the bottom of the screen with the space demons zooming in from the sides to hover over you. Only one demon per wave fires on you; the others simply hang around waiting to be shot. Each time you shoot the one demon that is firing, another moves in to take its place until the wave ends. There are eight demons per wave.

While the carton in which *Demon Attack* is packaged has an impressive picture of silver rocket-dinosaurs zooming through space, the actual game at first looks more like "Starling Attack." Remember when your mother told you not to look up at a flock of migrating birds? It took a while for me to think of the creatures as aliens, and the round things dropping from their bodies as bombs.

You begin the game with three spare missile bases, which are shown on the left corner of the screen. Each time you successfully destroy an entire wave of aliens without suffering a hit yourself, you are awarded a spare base. Only six bases at a time can be held in reserve, however.

The first wave is easy to destroy; simply move the missile base below your target and fire. If you choose an aggressive demon, fire and move away quickly before the bombs hit you. There is plenty of time to fire and run. The hardest thing about the first wave is hitting the benign creatures at the end of the wave that do not fire but are very difficult to hit as they drift randomly across the screen.



The second wave is the same as the first.

The third and fourth waves have crab-like creatures that fire double lazer beams, with the second batch firing shots closer together. You may have trouble moving your base under the firing alien between shots, so your timing must be good. Wait as close as you can to the spot directly below the offending creature; as soon as the last of his shots hits the ground, move quickly to the other side.

The fifth and sixth waves have creatures that split in two when hit. However, when one divides, only one half continues dropping bombs. If you can hit half of the divided alien, the other half will twitter (again, like the starlings) and flutter to the ground. It will chase you, but you can either shoot it or outrun it in most cases. If you move to the far edge of the screen, the half-demon will usually hit the ground before it gets to you. Outrunning them is often safer, but, of course, you miss an opportunity to score points by hitting them.

Since the bigger, undivided demons are wider, they cover more area with their bombs. Therefore, it is to your advantage to split the agressive one up as soon as possible, making it easier to dodge underneath it as you eliminate its cohorts; do not shoot the aggressive halves. Try to shoot all of the harmless aliens first, since they will be replaced by more harmless ones and you will not have to have too much contact with the bombers. This is especially important as the undivided bombers become more and more dangerous in later waves.

The aliens in the seventh and eighth waves shoot lasers and divide when hit.

In the ninth and tenth waves the bombs have a tendency to drift, making it very difficult to get close to the undivided bomber without getting sprayed by the bombs. Avoid getting caught in a corner, since the bombs drift toward you and there is nowhere for you to go.

The eleventh and twelfth waves have demons which rhythmically shrink and then return to full size. They are very difficult to hit when undivided, but when split they react like all of the other starlings . . .er, demons. They shoot drifting lasers.

If you can get this far in the game then you can handle yourself well enough to continue without my help. Rest assured, you will never run out of demons.

### Controllers

The joystick controls the horizontal movement of your missile base, allowing it to chase or avoid the attacking space demons. Pressing the red button on the controller fires one missile. Since only one missle can be in the air at any one time, holding the button down does not produce rapid fire.

### Scoring

Each time you hit a space demon you are awarded points, with each wave of demons becoming progressively more dangerous and therefore more valuable in terms of points.

### Game Variations

Game 1: Basic Game

Game 2: Basic Game for two people. Each person finishes one whole wave before the other gets a turn.

Game 3: Same as Game 1, only the missiles are controlled by the joystick. Moving the joystick in any direction causes both the missiles and the missile base to move accordingly. This changes the strategy of the game somewhat, since the fire-and-run technique results in the missile totally missing its mark. You must fire and then quickly direct the missile to the appropriate demon.

Game 4: Game 3 for two people.

Game 5: An advanced version of the Basic Game. The opening wave is the same as the ninth wave of Game 1. Also, the missiles move faster.

Game 6: Game 5 for two people.

Game 7: Same as Game 5, but with steerable missiles.

Game 8: Game 7 for two people.

Game 9: Same as Game 2, except that each works on the same wave, alternating turns. Each turn lasts only a few seconds.

Game 10: Same as Game 9, except with steerable missiles.

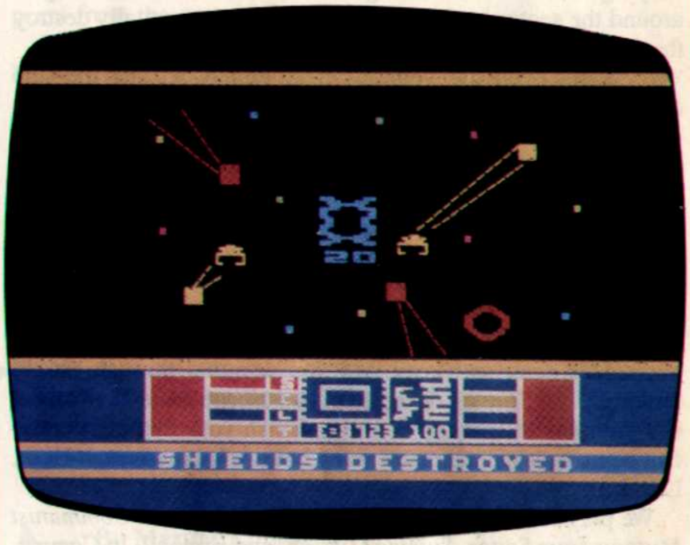
### Comments

This game is a lot like many other alien invasion games, except that success depends more on timing than on fast reactions. It is challenging without being impossible.

**By David H. Ahl**

## Phaser Patrol by Starpath

With the incredible success of *Star Raiders* for the Atari 400 and 800 computer systems, it was only a matter of time until variations and takeoffs were devised for other game playing systems. For the Atari VCS, you have a choice of four versions: *Star Raiders* from Atari, *Star Master* from Activision, *Star Voyager* from Imagic, and *Phaser Patrol* from Starpath (formerly Arcadia). Since this is the "base" Starpath game, which includes the Super Charger necessary for other Starpath games, we have chosen to describe it here.



First a word about the Super Charger. This is a device made by Starpath which provides an additional 6K of memory for the Atari Video Computer System (permits higher resolution graphics) and also an input port so that a standard cassette recorder may be connected to the VCS to load tapes containing games. Although the Super Charger plus *Phaser Patrol* is relatively pricey ($69.95), it permits other Starpath games to be purchased on standard cassettes at bargain basement prices ($14.95). Price-wise, the crossover point is reached when you purchase your fourth Starpath game; from there on, games on cassette are a bargain by any standard.

Unlike some computers we know, where the adjustment of volume and tone controls on the recorder must be within very narrow limits, the Starpath Super Charger system was quite forgiving and allowed loading cassettes from several different recorders over a wide variety of tone and volume settings. We applaud Starpath for a well engineered product.

*Phaser Patrol* is a game played in two phases: navigation and space battle. In the navigation phase, the screen shows a checkerboard grid of 36 sectors. Each is marked with one of three symbols designating Dracon fighters, a friendly starbase or contents unknown.

You choose a destination by moving the white cursor with your joystick to a distant sector and pressing the red button to warp there.

Upon flying into a sector occupied by Dracons, your condition alert indicator lights up red. In addition to that indicator, you have four others indicating the status of your shields (operational, damaged, or destroyed), computer (helps in navigation and firing), long-range scanners, and torpedos.

A radar screen in the center bottom portion of your display shows the location of Dracon attackers, both in and outside your view area. Your mission clock shows elapsed time, an energy gauge indicates your reserve, and, finally, a message display gives you important messages concerning ship damage, combat performance, etc. Got that?

It may seem like a lot to absorb, but once you become immersed in the play of the game, it's second nature to keep one eye on your instrument panel and the other on your window into space. That's where the real action takes place.

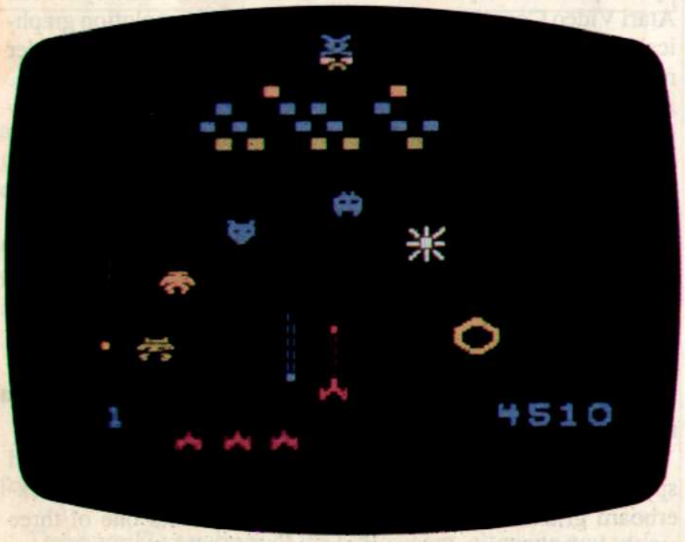
In the center of your window is a phaser torpedo sight with a rangefinder below it. Hidden among the stars in each sector are a varying number of Dracon fighters. Your mission is to navigate around the sector tracking the Dracons, and eventually destroy them.

To do this, you use your joystick. Pull back, and the ship climbs. Push forward, it dives. Move left or right, and the ship will, too. As soon as your phaser torpedo sight is locked on target, press the red firing button and your torpedo will chase the Dracon and destroy it. Miss the first shot, and the Dracon has a good crack at you.

As your energy gets low, you must find a sector with a friendly starbase where you can refuel.

*Phaser Patrol* rewards the player who destroys the Dracon armada quickly and efficiently. At the end of each game, you are awarded a rank and level. As you progress through the 16 rankings, you'll learn to figure out an escape route in advance, use your shield sparingly, and replenish your fuel efficiently. But beware, it will take you many hours of play to reach Hero, Level A.

We play-tested three other games from Starpath: *Communist Mutants from Space, Suicide Mission,* and *Fireball*. In *Communist Mutants,* a deadly armada of mutants is positioned at the top of the screen by a diabolical Mother Creature whose objective is to attack your planet and enslave its inhabitants.



The Mother Creature does this by laying eggs that hatch into bloodthirsty Commie mutants. Your defense is the usual laser cannon. The mutants swoop down at you in Galaxian-type formations against which you must defend Mother Earth.

We found in playing the game that the only way to clear the screen was to eliminate the Mother Creature. This is reasonably easy to do with the penetrating fire option since a penetrating bomb eliminates all creatures in its path of fire as it continues to the top of the screen.

On the other hand, with the time warp option (pulling back on the joystick "stops time" briefly) eliminating the Mother Creature is more difficult. Basically, while time is stopped, you must clear a path in the center of the attack wave so you can get a clear shot at the Mother Creature.

Other options provide for guided fire, shields, difficulty level (1 to 9), and number of players (1 to 4). It is not necessarily a reflection of our political leanings when we say the game is good clean fun.

The *Fireball* cassette includes five separate games which combine the themes of Breakout and Juggler. Your goal as a cute little animated juggler at the bottom of the screen is to keep between two and six balls in motion, then hit them handball-style into variously shaped block walls overhead.

In *Suicide Mission,* you become a microscopic submarine in a wounded body. Your enemy is a viral colony. A direct hit with a penicillin torpedo divides the colony. Hit it again, and the pieces divide into creepy little viruses. Substitute "asteroids" for "viruses," and you have the idea of the game. If you like Asteroids, but you prefer the warmth of a human body, try *Suicide Mission.*

**By David H. Ahl**

## Empire Strikes Back by Parker Brothers

### Game Description

In *The Empire Strikes Back,* you are the pilot of a highly maneuverable, missile-firing snow-speeder. Your enemy is an army of Imperial Walkers who are marching toward your power generator on the ice planet Hoth.

The object of the game is to destroy as many of the Imperial Walkers as you can before they reach the power generator at the right end of the battlefield or before they destroy your fleet of snow-speeders.

As a rebel commander, you receive five snow-speeders per game. To start the action, you fly your snow-speeder toward the left to meet the oncoming Imperial Walkers. The Walkers approach in a single file, moving from left to right. Only one Walker appears on the screen at a time.

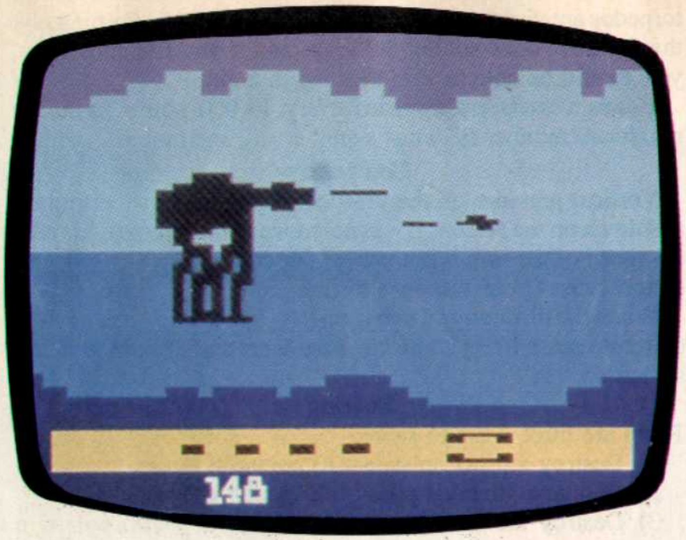
Your radar indicator at the bottom of the screen shows where all five Walkers are. It also shows which Walker you are presently battling on the screen.

It is important to remember that as soon as the lead Walker reaches the right end of the battlefield shown on the radar indicator, it blows up the power generator and ends the game. Just before this happens, you hear a warning sound and the sky begins to flash.

Imperial Walkers are tough. It takes 48 hits on the body to destroy one. Each group of eight hits weakens the Walker one stage and changes its color. Each color change means that the Walker is walking slower, firing less often and aiming less accurately.

While repeated firing is a sure way to destroy a Walker, there is a quicker way—by firing a missile into a "bomb hatch."

Bomb hatches are indicated by flashing colored squares that appear from time to time on a weakened Walker. Bomb hatches appear one at a time in one of three places: just above the head,



just below the head, or on the back. Hit a bomb hatch, and it means instant destruction of the Walker.

When you destroy an Imperial Walker, a new one enters the battlefield. Each new Walker is even tougher than the last. It walks faster, fires its missiles more rapidly, and aims its fire more accurately.

Imperial Walkers fire deadly missiles at snow-speeders, some of which even have the ability to "track" your snow-speeder. Walkers can aim their missiles at snow-speeders approaching from behind as well as head on.

When your snow-speeder is damaged, you may land in a valley for a moment for repairs. However, each snow-speeder is allowed only two repairs before it is out of commission.

Thus, your best bet is to try to stay out of the Walker's line of fire or, if you feel particularly reckless, you can try to shoot down the Walkers' missiles. This is risky business, and we found it was generally a better strategy simply to avoid the missiles.

If you can keep your snow-speeder alive for two minutes, "the Force will be with you." Your snow-speeder will begin flashing and you will hear the theme song of the rebels. The Force will be with you for 20 seconds. During this time, your snow-speeder is all-powerful. It cannot be damaged or destroyed. So when you gain the Force, move right in on the Imperial Walker and fire away.

Initially, your biggest problem in this game will be learning to control your snow-speeder, in particular, learning how to make it hover in front of an approaching Walker. Since the Walkers move relentlessly forward and it takes 48 shots to destroy each one, you don't have time to fly back and forth between them. You must keep hammering away at the first few Walkers in the line until the first one finally drops. By this time, the second one will have made good progress, and you will have to concentrate your attack on him. You just don't have time to fly from one end of the battlefield to the other; rather you must concentrate your attention on the lead Walkers.

We found it was generally better to attack a Walker from the front since two of the three bomb hatches on its body are toward the front. You want to be in a position to immediately dive in on one when it starts flashing. Not that you will always score a hit (you seldom will), but you will have a greater probability of success if you attack from the front.

After sustaining a hit by a Walker, it is generally worthwhile to stay in battle a little while longer rather than going immediately for repairs. Since you are allowed only two repairs on a snow-speeder, if you can prolong the active duty cycle, you will get maximum fighting time from your vechicle.

We found the playing hints in the instructions very worthwhile. They recommend trying to weaken the lead Walker without destroying it. By so doing, you will slow down the walking speed of all the others. This will give you more time to weaken and destroy the other Walkers before the lead one reaches the power generator.

### Game Variations

*The Empire Strikes Back* has 32 game variations, 16 for one player and 16 for two players. Three factors are varied in the games.

*Smart bombs*. In game variations with smart bombs, sometimes the Walker will release a smart bomb which flys in a looping pattern and will follow your snow-speeder. You can try to shoot it down for 100 points for you can outfly it until it disappears from the screen.

*Solid walkers*. Normally you can fly effectively "through" a Walker. However, in games with solid Walkers you cannot fly your snow-speeder through the body of a Walker (although you can fly between its legs). However, hitting the Walker with your snow-speeder will weaken the Walker three colors and will also cause the loss of your snow-speeder.

*Level of difficulty*. Each game variation has four levels of difficulty.

### Scoring

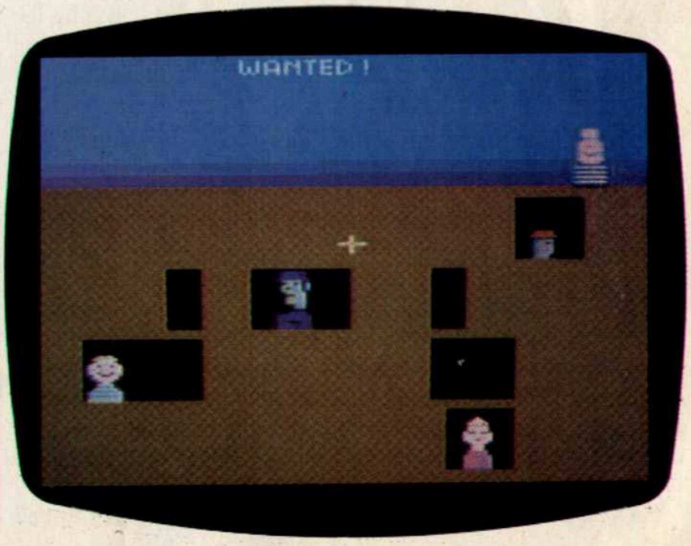
Points are awarded for the following actions: Hitting Imperial Walker with missile—1; Shooting down walker missile in flight—10; Crashing snow-speeder into walker—5; Destroying walker—50; Hitting bomb hatch to destroy a walker—100; Shooting down smart bomb—100; Also, for each 2000 points you score, you receive one extra snow-speeder.

**By Martha Koppin**

## Gangster Alley by Spectravision

### Game Description

*Gangster Alley* begins with a picture of a building with an escaped convict (Nitro Ed) running around on top. Gradually, different faces appear in the windows and you must move your rifle sight to zero in on the gangsters, but avoid the hostages. If they stand up high enough to draw their guns, they shoot and you lose one of your bullet-proof vests. (You start out with four vests and



are awarded an extra for every 5000 points.) Sometimes Nitro Ed will hold a bomb over his head; he must be shot immediately to prevent him from dropping the bomb and blowing up everybody (and, incidentally, ending the game). Not surprisingly, the reward on him is the largest.

Success in this game depends on fast reactions, but also on being able to move the joystick accurately. Overshooting your mark results in wasted time and the possible loss of a vest.

### Controllers

The joystick moves the sight of your gun. Press the red button to fire.

### Scoring

For each gangster you shoot, you are awarded a different number of points, depending on which one it is and how quickly you hit him. In the instruction booklet there are mug shots of the gangsters and a list of the various points (in this game the points are actually dollars) awarded.

If you shoot the woman or the child, $1,000 is deducted from your score. (Not that that will necessarily make them feel any better about being shot!)

At the end of each phase you are awarded 10 points for every bullet you did not use. (You are alloted 24 bullets per phase.)

### Game Variations

Game 1: Basic Game
Game 2: Basic Game for two players
Game 3: Children's game
Game 4: Children's game for two players

**By Martha Koppin**

## Planet Patrol by Spectravision

### Game Description

Planet Spectra has been invaded by enemy forces and your mission in *Planet Patrol* is to destroy their missile bases. The enemy's arsenal contains heat seeking torpedos and drone missiles. If either hit the patrol vessel, it will be destroyed. The drone missiles can be knocked out by your laser blasts, but the torpedos are indestructible and must be avoided.

On the planet are several stranded pilots who show up periodically. Don't shoot them as they are on our team! Rescuing them will also net you a fair number of points.

Missile bases have been set up on the planet in clusters of three. They appear immediately after you rescue the pilot and are very easy to destroy. However, after the third one is hit the screen is scattered with debris which stands still for a moment and then, as you take off again, moves very quickly into the path of your ship. It is difficult to maneuver around the bits and pieces, so use the pause to position your space ship in the best spot to start threading its way through the debris.

If you do not destroy all three bases, you won't have to worry about the debris because you will hit the force field in front of the bases and end the game.

When and if you make it through the debris, a black landing strip appears. You must line up your vessel accurately to make a landing. As your space ship rolls to a stop, a fuel truck rolls out of nowhere to fill up your tanks. The gas gauge is in the lower left corner of the screen and will be red when your fuel is low.

As you progress through the various phases of the game, not only do the point values increase, but the enemy weapons move faster, making it more difficult to avoid a collision.

As you move to the dark side of the planet, the missiles and torpedos are visible only when you fire your lasers. Fortunately, the darkness does not last for long, and if you fire constantly, you should be able to avoid losing your ship.

Bonus vessels are awarded every 10,000 points, with the maximum number of extras stored at any one time being four.

### Controllers

Vertical pressure on the joystick moves your space ship up and down on the screen. It will not move to the left or right since the speed of the ship is not under your control. Pressing the red button causes your weapons to fire.

When the difficulty switch is on "b," your ship is bigger and therefore more likely to be hit. Beginners should start with the switch on "a."

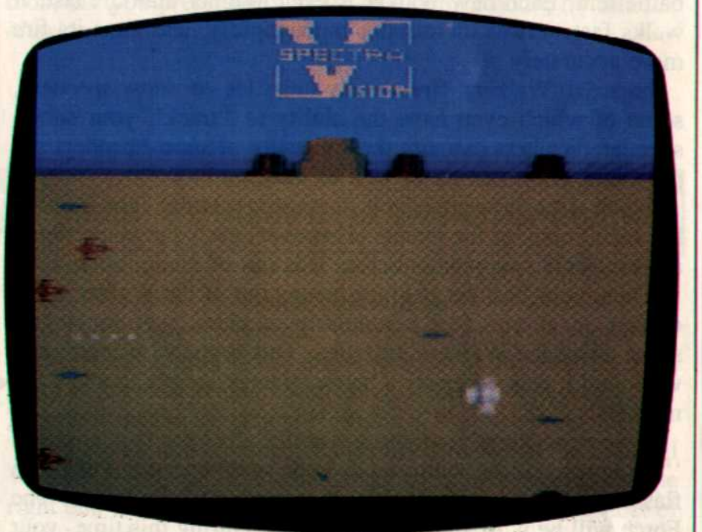
### Scoring

There are three ways to score:

1) Destroy a drone missile—10 points in Phase 1
2) Rescue a stranded pilot—100 points in Phase 1
3) Destroy the enemy base station cluster—200 points in Phase 1

These point values increase proportionately as you progress through each phase.

You are allowed four patrol vessels in the game.



### Game Variations

Game 1: Basic Game
Game 2: Basic Game for two players
Game 3: Children's Game
Game 4: Children's Game for two players

### Comments

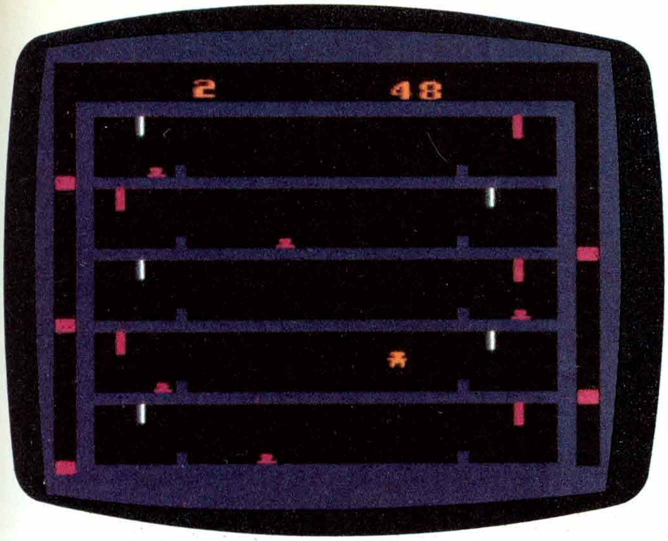
Part of the appeal to this game is its simplicity. Speaking as one who hates reading instructions, I appreciated the fact that a quick scan of the booklet enabled me to play a reasonably good game (although I did shoot my friend the stranded pilot).

Since *Planet Patrol* increases in difficulty as the game progresses, high scores are not easily attained. This game is basically a simpler (although not necessarily easier) version of Atari's Defender.

**By David H. Ahl**

## Airlock by Data Age

You are captain of a disabled nuclear submarine that has come to rest on a ledge perilously close to a gaping hole in the floor of



the ocean. Rocked by currents welling up from deep inside the earth, your vessel has begun to take on water in its lowest levels. Can you escape each level in time?

The objective in *Airlock* is to retrieve the hatch keys on each level and make your way to the next level before your compartment floods. At the same time you must avoid the torpedoes which have been shaken loose and which, when they cross your path, rob you of precious time.

When the fire button on the joystick controller is pressed, your player jumps and the timer starts. You must now retrieve the hatch keys in the proper order (orange key first, white key second) and make your way to the elevator. The elevators are on alternate sides of the screen at each level.

To retrieve a key, you move your player directly underneath it and press the fire button. The player will jump to collect the key. You also use the fire button to move your player over the barriers on each level as well as to help him jump over the torpedoes that constantly move across his path. If you miss and are struck by a torpedo, it will not explode (fortunately!), but you will be out of commission for several seconds before your player jumps up to resume game play.

You have ten seconds to complete a level. If there is any unused time at one level, it is credited to the next. As a result of this timing system, we found that the first level was by far the most difficult. You will find it easiest to complete if you wait to press the button to start until just after the torpedo has passed you heading from right to left.

Upon starting, immediately run right and jump the barrier. Position yourself under the key, jump up, and retrieve it. Run to the left, again jumping the barrier. Continue running and jump the torpedo and the other barrier at the left side. Then jump up and retrieve the white key and start running to the left where the elevator door will have now opened. As you touch the left wall, the elevator will rise to the next level.

It takes almost ten seconds to accomplish this procedure, so you will not be entering the second level with any extra time. However, it is somewhat easier because you start right next to the orange key and, by running to the right with three quick jumps (two for the barriers and one for the torpedo), you can retrieve the white key at the right side and be in the right elevator in about eight seconds.

While the pace of the game does not let up as you progress upward, at least you have a small buffer of a second or two which, by clever playing, you can sometimes increase as you go along.

One hint mentioned in the instructions which we found useful is to position your player so that he can jump a barrier and torpedo at the same time. It can save you precious seconds, and the time you save on one level may help you out on the next.

In *Airlock,* your only controls are the joystick which moves your player from left to right and the firing button which causes him to jump.

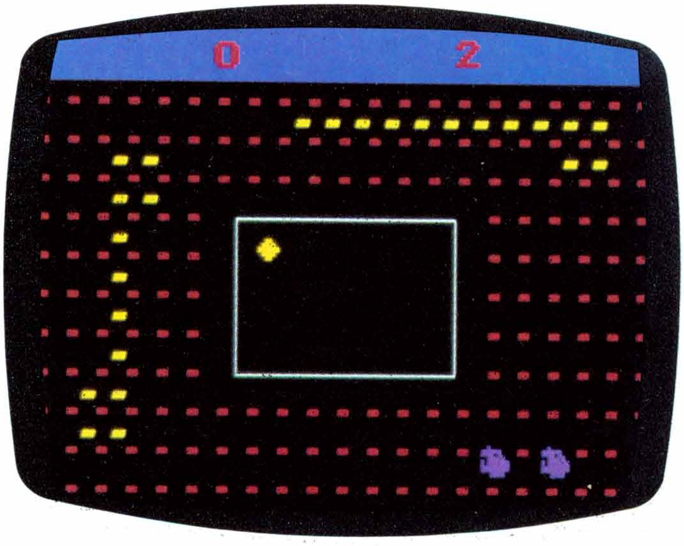
This is one of the few games in which scoring is not tallied by increasing points. Instead, you try to beat the clock and you "win" the game if you can escape to the top level.

There are four variations of *Airlock:* five airlock levels for one or two players and ten airlock levels for one or two players. In the variations with ten airlock levels, the second five levels have four barriers per level, thus providing an ample challenge for even the most seasoned submarine commander.

## Other Games From Data Age

We tried four other games from Data Age: *Sssnake, Encounter at L-5, Warplock,* and *Bugs. Warplock* is a variation on the Galaxian theme, while *Encounter at L-5* is a distant cousin (very distant!) of Missile Command. Both are challenging and entertaining.

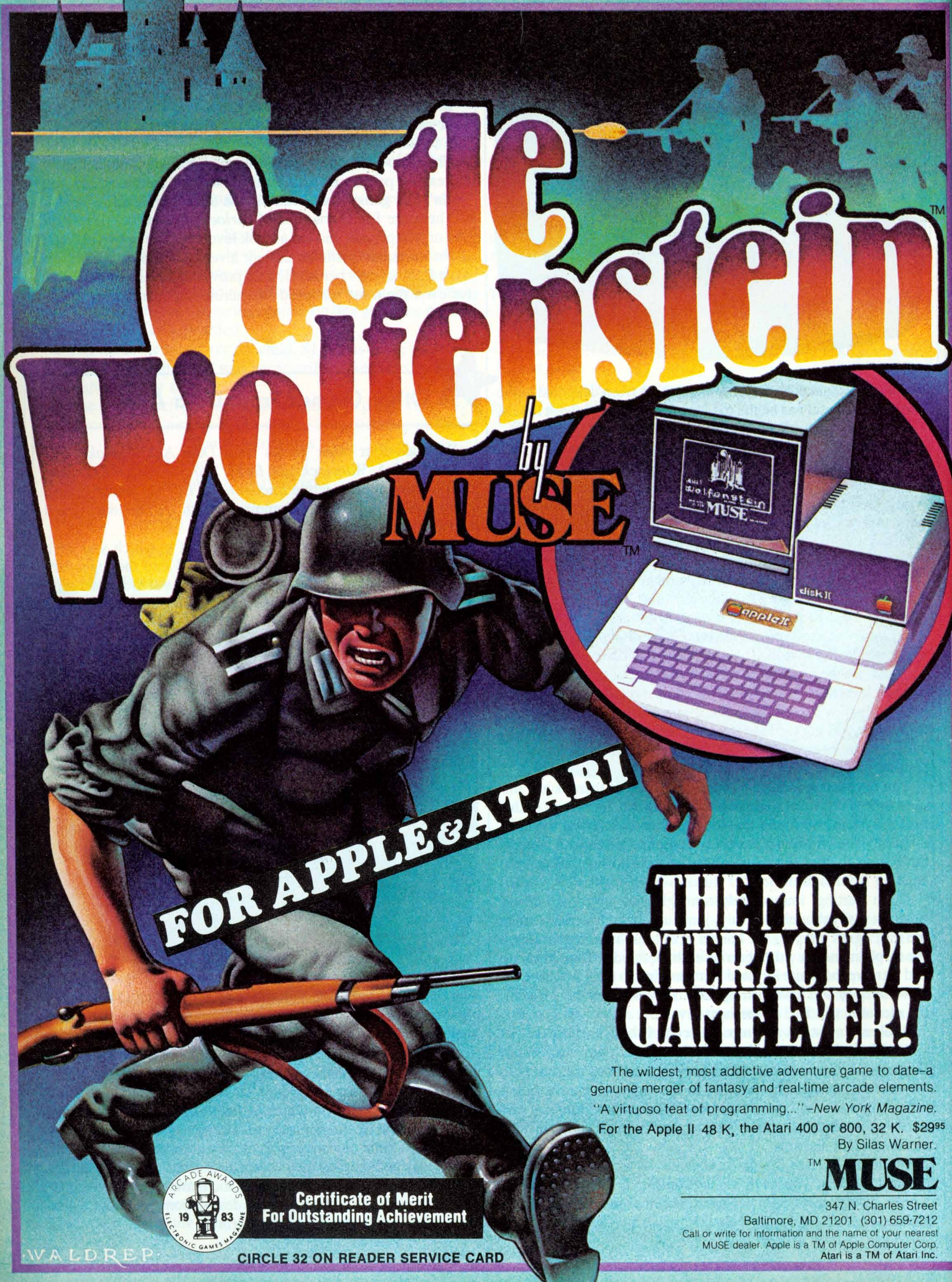
*Sssnake* is based on an original concept in which you are a daring big-game hunter who has stumbled into the legendary "land that time forgot." You are in a fortress at the center with snakes and other prehistoric creatures roaming the trails outside.



Not only that, but the snakes can't be destroyed and eventually they wriggle their way inside your fortress. Your only defense then is to avoid them.

Thus, *Sssnake* becomes a game of strategy in which you attempt to avoid the snakes while positioning your weapon to fire upon the other creatures (which can be killed). The woods are full of barriers (trees?) which deflect and absorb your shots. Strategy and skill are necessary to rack up big scores in *Sssnake.*

In *Bugs,* your objective is to zap giant insects which live in sub-terranean hives, as they escape to the surface. Since the action takes place on a distant planet there are many other rather unusual creatures, all bent on your destruction. We are sure glad these bugs don't live on planet Earth! ■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# HOME COMPUTER GAMES SECTION

# THE ORIGIN OF SPACEWAR!

By J. M. Graetz

## 1 BEFORE SPACEWAR!

### The Lensman, The Skylark, and the Hingham Institute

It's Kimball Kinnison's fault. And Dick Seaton's. Without the Gray Lensman and the *Skylark of Space* there would be nothing to write about. So most of the blame falls on E. E. Smith, but the Toho Film Studios and the American Research and Development Corp. have something to answer for as well. If Doc Smith had been content designing doughnuts, if American-International Pictures had stuck to beach blanket flicks, if (most of all) General Doriot hadn't waved money in front of Ken Olsen in 1957, the world might yet be free of *Spacewar!*

It all came together in 1961 at the Hingham Institute, a barely-habitable tenement on Hingham Street in Cambridge, MA. Three Institute Fellows were involved: Wayne Wiitanen, mathematician, early music buff, and mountain climber; J. Martin Graetz (which is me), man of no fixed talent who tended to act superior because he was already a Published Author; and Stephen R. (Slug) Russell, specialist in steam trains, trivia, and artificial intelligence. We were all about 25 (the more or less to be the same).

At the time, we were crashing and banging our way through the "Skylark" and "Lensman" novels of Edward E. Smith, PhD, a cereal chemist who wrote with the grace and refinement of a pneumatic drill. These stories are pretty much all of a piece: after some preliminary foofaraw to get everyone's name right, a bunch of overdeveloped Hardy Boys go treking off through the universe to punch out the latest gang of galactic goons, blow up a few planets, kill all kinds of nasty life forms, and just have a heck of a good time.

In a pinch, which is where they usually were, our heroes could be counted on to come up with a complete scientific theory, invent the technology to implement it, build the tools to implement the technology, and produce the (usually) weapons to blow away the baddies, all while being chased in their spaceship hither and thither throughout the trackless wastes of the galaxy (he wrote like that) by assorted Fenachrone, Boskonians, and the World Steel Corporation.

Is that enough to turn the mind to margarine? It is not. In breaks between books, we would be off to one of Boston's seedier cinemas to view the latest trash from Toho. In the days before Mazdas and Minoltas, the Japanese (and occasionally the British and Californians) churned out a steady diet of cinematic junk food of which Rodan and Godzilla are only the best known examples. These movies depended for their effects on high quality modelwork, oceans of rays, beams, explosions and general brouhaha, and the determined avoidance of plot, character, or significance. They were the movie equivalent of *The Skylark of Space*.

If that's the case, we asked ourselves, why doesn't anyone make *Skylark* movies? Hearing no reply (our innocence of current film technology, economics, and copyright laws as enormous), we often passed the time in the Hingham Street common room in deep wishful thought, inventing special effects and sequences for a grand series of space epics that would never see a sound stage. Nonetheless, these books, movies, and bull-sessions established the mind-set that eventually led to *Spacewar!*

### When Computers Were Gods

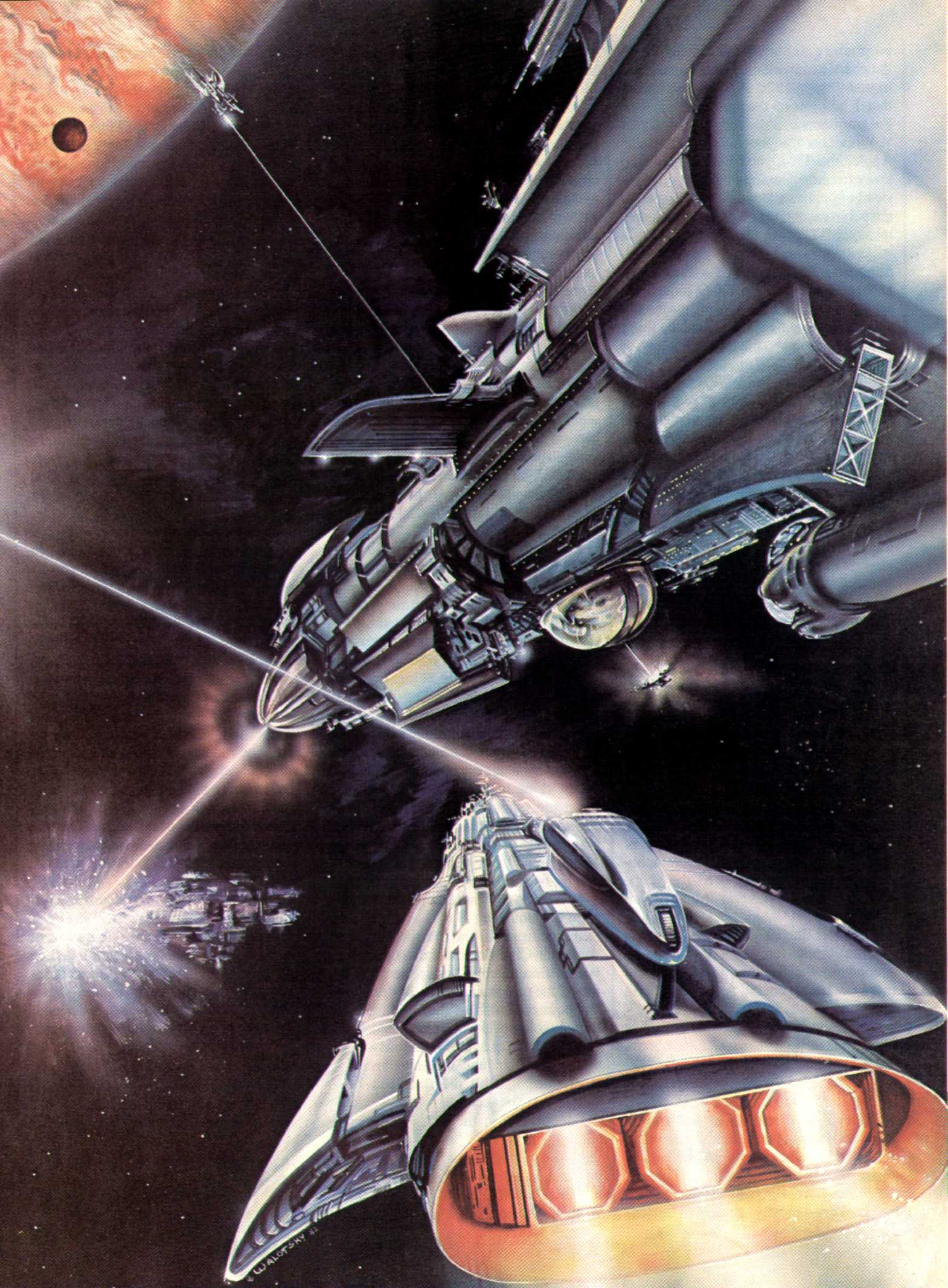
In early 1961 Wayne, Slug, and I, by no coincidence, were all working at Harvard University's Littauer Statistical laboratory. A large part of our jobs was to run statistics computations for various Harvard persons. The agent of choice for this work was an IBM 704.

To a generation whose concept of a computer is founded on the Z80 chip, it may be hard to visualize a 704 or to comprehend the place it held in the public imagination (along with UNIVAC) as the type specimen of what a computer was: a collection of mysterious hulking gray cabinets approachable only through the intercession of The Operator. In the specially built computer room, The Operator set switches, pushed buttons, and examined panels of flashing lights, while his Assistants attended various whirring, clanking, and chattering devices, rushing to and fro with stacks of cryptically-printed paper, decks of weirdly-punched cards, and reels of recondite brown ribbon, all to the background hum of The Machine. Add a little incense and a few candles, and you could be forgiven for thinking these were the rites of some oracular shrine.

Everything about the 704, from the inscrutable main frame to the glowing tubes (yes, tubes!) in the glass-walled core memory case, proclaimed that this was a Very Complicated System operated only by Specially Trained Personnel, among whom progammers and other ordinary mortals were not numbered. In short, a computer was something that you simply did not sit down and fool around with.

### A Stone's Throw From Olympus

In the summer of 1961 I went to work for Professor Jack B. Dennis, who was then the proprietor of the TX-O, a machine that to me was only slightly less legendary than its ancestor, Whirlwind. The TX-O was transistorized, and while solid-state computers were beginning to appear on the market, the "Tixo" was the original. Even in 1961 it was acknowledged to be a historically important research facility; many of the programs developed on the TX-O, such as Jack Dennis's MACRO Assembler and Thomas Stockham's FLIT debugging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program, were the first of their kind. So the chance to work on this computer was in many ways a rite of passage; it meant that I had joined the ranks of the Real Programmers.

While hardly your average populist Apple, the TX-O was definitely a step away from the Computer-As-Apollo. Instead of being sealed into its own special chapel, it sat at one end of a typical large, messy MIT research space. With its racks of exposed circuitry, power supplies and meters, and its long, low L-shaped console, the TX-O looked for all the world like the control room of a suburban pumping station. And the thing of it was, you were expected to *run it yourself*.

So here was the former 704 Operator's Assistant pushing buttons, flipping switches, and pressing keys to make his own programs work. In some ways it was simpler than the 704; for one thing, there wasn't a battery of clanking mechanical monsters. The TX-O's input and output medium was something called a Flexowriter: an all-in-one keyboard, printer, paper-tape reader and punch, that worked like a mule and had a personality to match. There was also a "high-speed" paper tape reader, a Grand Prix whiz that could read programs into memory almost as fast as the cassette-tape reader on a TRS-80.

And the TX-O had a Scope. Now console-mounted, programmable CRTs were not unheard of at that time but they were generally slow, inflexible, and awkward to program. The TX-O scope on the other hand, was easy to use; you could generate a useful display with fewer than a dozen instructions. And if that weren't enough, there was a magic wand: the light pen. (The importance of these two devices can't be overemphasized; Ivan Sutherland used the scope and the pen to develop his original "Sketchpad.")

That was the TX-O: the world's first on-line computer, and the training ground for the designers and programmers of later generations of hands-on machines. The first computer bums—hackers—were the products of this training; without it, and them, there would have been no *Spacewar!*

### Tixo's People

The users of the TX-O were a melange of students, staff researchers and professors with not much in common other than their need for large amounts of largely unstructured computer time. The feel of the place, however, was established by the hackers—mostly students, but including a professor or two—whose lives seemed to be organized in 18-bit strings. Many of them worked for Professors John McCarthy and Marvin Minsky in the Artificial Intelligence Group, an odd bunch (even by MIT standards) who seemed convinced that given enough random-access memory and a really fast cycle time you could model the cognitive parts of the brain and hey presto! a real thinking machine. Others worked for Professor Dennis, who presided over the use and development of the TX-O and more or less benignly kept a semblance of order. The man who kept it all running was a soft-spoken, white-haired gentleman, John McKenzie, the chief engineer.

Out of this cloud of computer bums emerged the group that brought *Spacewar!* to the silver (well, light gray) screen: Dan Edwards (AI Group), Lisp specialist; Alan Kotok (TX-O staff), who wrote MIDAS, the successor to MACRO; Peter Samson (AI Group), who made the Tixo and PDP-1 play Bach; and Steve Russell and I.

### "You Mean That's All It Does?"

When computers were still marvels, people would flock to watch them at work whenever the opportunity arose. They were usually disappointed. Whirring tapes and clattering card readers can hold one's interest only so long. They just did the same dull thing over and over; besides, they were obviously mechanical—at best, overgrown record changers—and thus not mysterious. The main frame, which did all the marvelous work, just sat there. There was nothing to *see*.

On the other hand, something is always happening on a TV screen, which is why people stare at them for hours. On MIT's annual Open House day, for example, people came to stare for hours at Whirlwind's CRT screen. What did they stare at? Bouncing Ball.

Bouncing Ball may be the very first computer-CRT demonstration program. It didn't do much: a dot appeared at the top of the screen, fell to the bottom and bounced (with a "thok" from the console speaker). It bounced off the sides and floor of the displayed box, gradually losing momentum until it hit the floor and rolled off the screen through a hole in the bottom line. And that's all. Pong was not even an idea in 1960. (Note: Well, maybe not Pong, but something very much like it. See "Who Really Invented The Video Game?" in this issue—DHA)

The TX-O's counterpart to Bouncing Ball was the Mouse in the Maze, written by Douglas T. Ross and John E. Ward. Essentially, it was a short cartoon: a stylized mouse searched through a rectangular maze until it found a piece of cheese which it then ate, leaving a few crumbs. You constructed the maze and placed the cheese (or cheeses—you could have more than one) with the light pen. A variation replaced the cheese with a martini; after drinking the first one the mouse would stagger to the next.

Besides the Mouse, the TX-O also had HAX, which displayed changing patterns according to the settings of two console switch registers. Well-chosen settings could produce interesting shapes or arrangements of dots, sometimes accompanied by amusing sounds from the console speaker. The console speaker is a phenomenon whose day seems to have passed. More than just a plaything, for the experienced operator the speaker was a valuable guide to the condition of a running program.

Finally, there was the inevitable Tic-Tac-Toe, with the user playing the computer. The TX-O version used the Flexowriter rather than the scope. (The game is so simple to analyze that there was even a version for the *off-line* Flexo.)

These four programs pointed the way. Bouncing Ball was a pure demonstration: you pushed the button, and it did all the rest. The mouse was more fun, because you could make it different every time. HAX was a real toy; you could play with it while it was running and make it change on the fly. And Tic-Tac-Toe was an actual game, however simpleminded. The ingredients were there; we just needed an *idea*.

### The World's First Toy Computer

For all its homeliness, the TX-O was still very much a god. It took up lots of space, it had to be carefully tended, it took special procedures to start it up and shut it down, and it cost a lot of money to build.

**The TX-O.**

All this changed in the fall of 1961, when the first production-model PDP-1 was installed in the "Kluge Room" next door to the TX-O. It had been anticipated for months; an early brochure announcing the machine (as well as a couple of no-shows called the PDP-2 and PDP-3, in case you were wondering about that) had been circulating in the area for a while. It was clear that the PDP-1 had TX-O genes; the hackers would be right at home.

The -1 would be faster than the Tixo, more compact, and *available*. It was the first computer that did not require one to have an E.E. degree and the patience of Buddha to start it up in the morning; you could turn it on anytime by flipping one switch, and when you were finished, you could turn it off. We had never seen anything like that before.

## II SPACEWAR! BEGUN

### The Hingham Institute Study Group On Space Warfare

Long before the PDP-1 was up and running Wayne, Slug, and I had formed a sort of ad-hoc committee on what to do with it—it being the Type 30 Precision CRT Display which was scheduled to be installed a couple of months after the computer itself. It was clear from the start that while the Ball and Mouse and HAX were clever and amusing, they really weren't very good as demonstration programs. Why not? Zooming across the galaxy with our Bergenholm Intertialess Drive, the Hingham Institute Study Group on Space Warfare devised its Theory of Computer Toys. A good demonstration program ought to satisfy three criteria:

1) It should *demonstrate,* that is, it should show off as many of the computer's resources as possible, and tax those resources to the limit;

2) Within a consistent framework, it should be interesting, which means that every run should be different;

3) It should involve the onlooker in a pleasurable and active way—in short, it should be a game.

With the Fenachrone hot on our ion track, Wayne said, "Look, you need action and you need some kind of skill level. It should be a game where you have to control things moving around on the scope, like, oh, spaceships. Something like an explorer game, or a race or contest . . . a fight, maybe?"

"SPACEWAR!" shouted Slug and I, as the last force screen flared into the violet and went down.

The basic rules developed quickly. There would be at least two spaceships, each controlled by a set of console switches ("Gee, it would be neat to have a joystick or something like that . . ."). The ships would have a supply of rocket fuel and some sort of weapon: a ray or a beam, possibly a missile. For really hopeless situations, a panic button would be . . . hmmm . . . aha! Hyperspace! (What else, after all, is there?) And that, pretty much, was that.

### The Hackers Meet Spacewar!

By the end of summer, 1961, Steve Russell had returned to the Artificial Intelligence Group (he'd worked there before Littauer); consequently, whatever ideas the Study Group came up with were soon circulating among the hackers. *Spacewar!* was an appealing, simple concept, and the hackers were the appealingly simple people to bring it to life. First, however, there was the small matter of software.

The PDP-1 was a no-frills machine at the beginning; except for a few diagnostic and utility routines, there was no program library. In a way this suited the hackers just fine; here was a chance both to improve on TX-O software and to write new stuff that couldn't have been done before. First, and fairly quickly, MACRO and FLIT were translated from TXish to PDPese, FLIT becoming the first in a continuing line of DDT on-line debugging programs. Steve Piner wrote a text display and editing program called Expensive Typewriter (For a while, "expensive" was a favorite adjective for naming various PDP-1 routines that imitated the functions of more mundane devices. Among them was Peter Samson's E. Planetarium, as we shall see.), another original whose lineage you can trace, if you like, right down to the latest word processors.

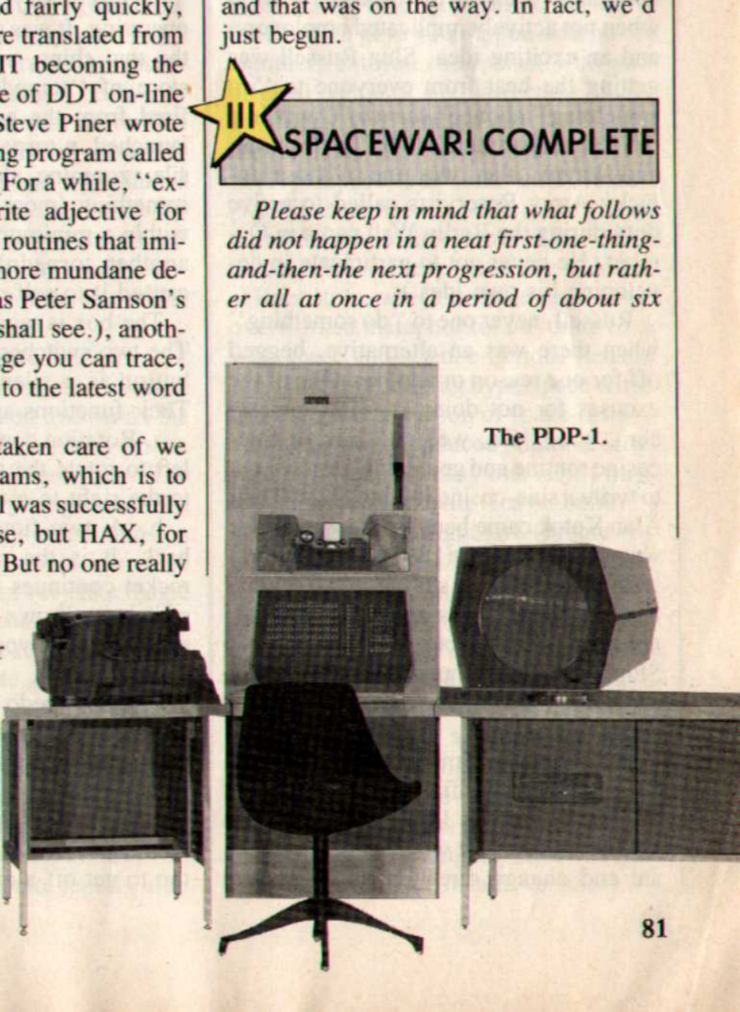
With the software taken care of we could write real programs, which is to say toys. Bouncing Ball was successfully converted to PDP-1 use, but HAX, for some reason, was not. But no one really missed it, because we had a brand-new toy invented by Professor Marvin Minsky. The program displayed three dots which proceeded to "interact," weaving various patterns on the scope. As with HAX, the initializing constants were set in the console switches. Among the patterns were geometric displays, Lissajous-like figures, and "fireworks." Minsky's program title was something like "Tri-Pos: Three-Position Display," but from the beginning we never called it anything But The Minskytron. ("tron" was the In suffix of the early 1960s.)

The classic needle and wedge ship outlines and the opposite-quadrant starting positions were established at this stage, as shown in Figure 1. Acceleration was realistic; it took time to get off the mark, and to slow down you had to reverse the ship and blast in the other direction; the rocket exhaust was a flickering "fiery tail." Rotation, on the other hand, was by something we called "gyros"—a sort of flywheel effect invented to avoid consideration of messy things like moments of inertia. I guess they were really rotational Bergenholms.

It was apparent almost immediately that the featureless background was a liability. It was hard to gauge relative motion; you couldn't tell if the ships were drifting apart or together when they were moving slowly. What we needed, obviously, were some stars. Russell wrote in a random display of dots, and the quality of play improved. The only thing left, we thought, was hyperspace, and that was on the way. In fact, we'd just begun.

## III SPACEWAR! COMPLETE

*Please keep in mind that what follows did not happen in a neat first-one-thing-and-then-the next progression, but rather all at once in a period of about six*



The PDP-1.

*weeks. When hackers are aroused, anything that can happen will.*

### The Control Boxes

*Spacewar!* worked perfectly well from the test word switches on the console, except that the CRT was off to one side, so one player had a visual advantage. More to the point, with two excitable space warriors jammed into a space meant for one reasonably calm operator, damage to the equipment was a constant threat. At the very least, a jittery player could miss the torpedo switch and hit the start lever, obliterating the universe in one big anti-bang. A separate control device was obviously necessary, but joysticks (our original idea) were not readily available in 1962. So Alan Kotok and Robert A. Saunders, who just happened to be members of the Tech Model Railroad Club, trundled off to the TMRC room, scrabbled around the layout for a while to find odd bits of wood, wire, bakelite, and switchboard hardware, and when the hammering and sawing and soldering had ceased, there on the CRT table were the first *Spacewar!* control boxes (Figure 2. These boxes have long since disappeared, but the sketch is a reasonably accurate reconstruction).

### First Steps

By the end of 1961, all the elements were in place: a brand new, available computer, a cloud of hackers, tolerant when not actively implicated employers, and an exciting idea. Slug Russell was getting the heat from everyone to "do something" about *Spacewar!* (I was in a different department at MIT by this time, and Wayne, alas, was one of those unlucky Army Reservists called to active duty during the Berlin Wall panic in October. He never got to participate in developing his own idea.)

Russell, never one to "do something" when there was an alternative, begged off for one reason or another. One of the excuses for not doing it, Slug remembers, was, "Oh, we don't have a sine-cosine routine and gee, I don't know how to write a sine-cosine routine . . ." Then Alan Kotok came back from a trip all the way to Maynard (DEC headquarters) with paper tapes saying "All right, Russell, here's a sine-cosine routine; now what's your excuse?" "Well," says Slug, "I looked around and I didn't find an excuse, so I had to settle down and do some figuring."

With the heavy mathematics in hand, Slug produced the first object-in-motion program in January 1962. This was nothing more than a dot which could accelerate and change direction under switch control. Even without a hardware multiply-divide capability (on the early PDP-1s, anything stiffer than integer addition and subtraction had to be done by subroutine) the computer was clearly not being pushed.

From dot to rocket ship was a surprisingly easy step: "I realized" Slug says, "that I didn't have to worry about the speed of the sine-cosine routine, because there were only two angles involved in each frame—one for each ship. Then the idea of rotating the grid came out." The ship outlines were represented as a series of direction codes starting from the nose of the ship; when the ship was vertical and tail-down, each code digit pointed to one of the five possible adjacent dots that could be displated next. To display the ship at an angle, Russell calculated the appropriate sine and cosine and added them to the original direction code constants, in effect rotating the entire grid. With this method, the ship's angle had to be calculated only once in each display frame. The outline codes were kept in a table so that different shapes could be tried out at will, but this meant that the table had to be searched every frame to generate the outline. As the game developed, this arrangement proved to be a sticking point which we shall see, was neatly solved by Dan Edwards.

By February, the first game was operating. It was a barebones model: just the two ships, a supply of fuel, and a store of "torpedoes"—points of light fired from the nose of the ship. Once launched, a torpedo was a ballistic missile, zooming along until it either hit something (more precisely, until it got within a minimum distance of a ship or another torpedo) or its "time fuse" caused it to self-destruct.

The box is wood with a Bakelite top. The two switches are double-throw; the button is a silent momentary switch. Their functions are as follows:

a. Rotation control. It is pushed to the left to rotate the ship counterclockwise, to the right to rotate clockwise.

b. A two-function control. Pulled back, it is the rocket accelerator; the rocket continues to blast as long as the switch is thrown. Pushed forward, the switch is the hyperspace control, as described below.

c. The torpedo button. It had to be silent so that your opponent could not tell when you were trying to fire. (There was a fixed delay between shots "to allow the torp tubes to cool" and fire was not automatic; you had to keep pushing the button to get off a missile.)

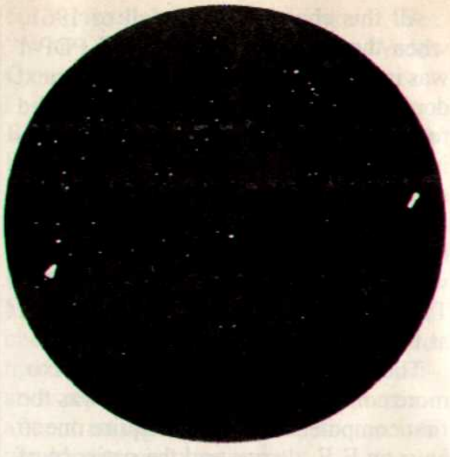


**Figure 1. The Starting Position. The ships are in the centers of diagonally opposite quadrants. The vee of stars at top center is the horns of Taurus. You should be able to pick out the stars of Orion at the left (the bright star just above the wedge-ship is Rigel).**

With the control boxes players could sit comfortably apart, each with a clear view of the screen. That, plus the carefully designed layout of the controls, improved one's playing skills considerably, making the game even more fun.

### The Stars of the Heavens

One of the forces driving the dedicated hacker is the quest for elegance. It is not sufficient to write programs that work. They must also be "elegant," either in code or in function—both, if possible. An elegant program does its job as fast as possible, or is as compact as possible, or is as clever as possible in taking advantage of the particular features of the machine in which it runs, and (finally) produces its results in an esthetically pleasing form without compromising either the results or operation of the other programs associated with it.

"Peter Samson," recalls Russell, "was offended by my random stars." In other words, while a background of mis-

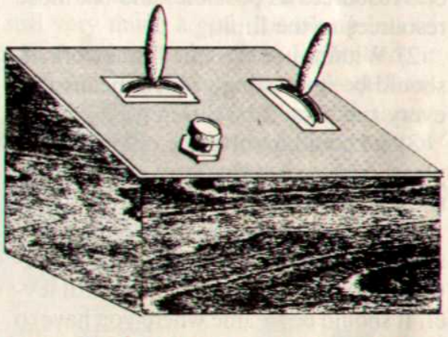


**Figure 2. The original control boxes looked something like this. The controls are a) right-left rotation, b) acceleration (pulled back) and hyperspace (pushed forward), and c) torpedo button.**

cellaneous points of light might be all very well for some run-down jerkwater space fleet, it just wouldn't do for the Galactic Patrol. So Peter Samson sat down and wrote "Expensive Planetarium."

Using data from the American Ephemeris and Nautical Almanac, Samson encoded the entire night sky (down to just above fifth magnitude) between 22 1/2° N and 22 1/2° S, thus including most of the familiar constellations. The display can remain fixed or move gradually from right to left, ultimately displaying the entire cylinder of stars. The elegance does not stop there. By firing each displayed point the appropriate number of times, Samson was able to produce a display that showed the stars at something close to their actual relative brightness. An attractive demonstration program in its own right, E.P. was "duly admired and inhaled into *Spacewar!*"

### The Heavy Star

Up to this point, *Spacewar!* was heavily biased towards motor skills and fast reflexes, with strategy counting for very little. Games tended to become nothing more than wild shootouts, which was exciting but ultimately unrewarding. Some sort of equalizer was called for.

Russell: "Dan Edwards was offended by the plain spaceships, and felt that gravity should be introduced. I pleaded innocence of numerical analysis and other things"—in other words, here's the whitewash brush and there's a section of fence—"so Dan put in the gravity calculations."

The star blazed forth from the center of the screen, its flashing rays a clear warning that it was not to be trifled with. Its gravity well encompassed all space; no matter where you were, if you did not move you would be drawn into the sun and destroyed. (As a gesture of good will towards less skillfull or beginning players, a switch option turned annihilation into a sort of hyperspatial translation to the "antipoint," i.e., the four corners of the screen.)

The star did two things. It introduced a player-independent element that the game needed; when speeds were high and space was filled with missiles, it was often sheer luck that kept one from crashing into the star. It also brought the other elements of the game into focus by demanding strategy. In the presence of gravity both ships were affected by something beyond their control, but which a skillful player could use to advantage.

The first result of this new attention to strategy was the opening move in Figure 3, which was quickly dubbed the "CBS opening" because of its eye-like shape. It took a while to learn this maneuver but it soon became the standard opening among experienced players, as it generally produced the most exciting games.

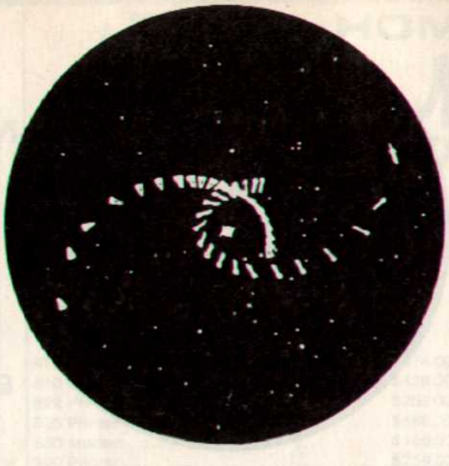


**Figure 3. The "CBS Opening." The ships turn slightly away from the star and fire a short rocket blast (note the needle-ship's exhaust) to get into a comet-type orbit, then rotate the other way to try shooting torpedoes at the opponent.**

The addition of gravity pushed *Spacewar!* over the edge of flicker-free display. To get back under the limit, Dan Edwards divised an elegant fiddle to speed up the outline display routine.

In Russell's original program, the outline tables were examined and interpreted in every display frame, an essentially redundant operation. Edwards replaced this procedure with an outline "compiler," which examined the tables at the start of a game and compiled a short program to generate the outline for each ship. This dramatically reduced calculation time, restoring the steady display and making room for the last of the original bells and whistles.

### Hyperspace

While all this was going on, I was in my secret hideaway (then known as the Electronic Systems Lab) working on the ultimate panic button: hyperspace. The idea was that when everything else failed you could jump into the fourth dimension and disappear. As this would introduce an element of something very like magic into an otherwise rational universe, the use of hyperspace had to be hedged in some way. Our ultimate goal was a feature that, while useful, was not entirely reliable. The machinery, we said, would be "the Mark One Hyperfield Generators . . . hadn't done a thorough job of testing . . . . rushed them to the fleet" and so on. They'd be good for one or two shots, but would deteriorate rapidly after that. They might not work at all ("It's not *my* fault, Chewie!") or if they did, your chances of coming back out intact were rather less than even. Slug: "It was something you could use, but not something you wanted to use."

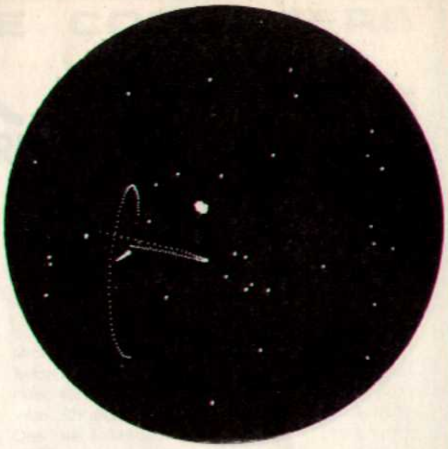


**Figure 4. "Warp-induced photonic stress emission." The Hyperspace Minskytron signature.**

The original hyperspace was not that elegant. "MK I unreliability" boiled down to this: you had exactly three jumps. In each jump your ship's coordinates were scrambled so that you never knew where you would reappear—it could be in the middle of the sun. You were gone for a discernible period of time, which gave your opponent a bit of a breather, but you came back with your original velocity and direction intact. To jump, you pushed the blast lever forward.

Hyperspace had one cute feature (well, I thought it was cute). Do you remember the Minskytron? One of its displays looked very much like a classical Bohr atom, which in those days was an overworked metaphor for anything to do with space and science-fiction. Reasoning that a ship entering hyperspace would cause a local distortion of space-time resulting in a warp-induced photonic stress emission (see how easy this is?), I made the disappearing ship leave behind a short Minskytron signature (Figure 4).

### Crocks and Loose Ends

In retrospect, it is remarkable that the original *Spacewar!* managed to include so many features, given the limitations of our PDP-1:4K words (about 9K bytes) of memory, an instruction cycle time of five microseconds, and a subroutine multiply-divide. It's hardly surprising, then, that we had to let a few unsatisfactory (all right, inelegant) bits go by.

The most irritating of these (and the first to be improved in later versions) was

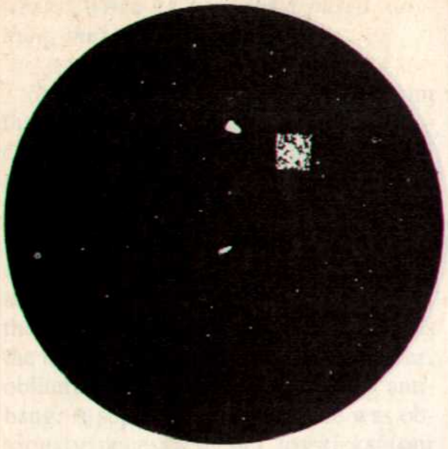


**Figure 5. The Crock Explosion. Nobody's perfect.**

the appropriately-named Crock Explosion. Something dramatic obviously had to happen when a ship was destroyed, but we were dealing with a plain dot-matrix screen. The original control program produced a random-dot burst confined within a small square whose outlines were all too discernible (Figure 5).

This explosion was intended merely as a place-holder until something more plausible could be worked out, but after all the other features had been "inhaled," there wasn't room or time for a fancier calculation.

Similarly, the torpedoes were not quite consistent with the *Spacewar!* universe after the heavy star was in place. The gravity calculations for two ships were as much as the program could handle; there was no time to include half a dozen missiles as well. So the torpedoes were unaffected by the star, with the odd result that you could shoot right through it and hit something on the other side (If you weren't careful getting around the Star, it could be you.) We made the usual excuses . . . mumblemumble photon bombs mumblemumble . . . but no one really cared.

The heavy star itself was not entirely Newtonian. The common tactic of plunging down the gravity well to gain momentum by whipping around the sun (Figure 6) gave you somewhat more energy than you were really entitled to. As this just made the game more interesting, nothing was immediately done to correct it.

## IV AFTER SPACEWAR!

The game was essentially complete by the end of April, 1962. The only further immediate work was to make *Spacewar!* presentable for MIT's annual Science Open House in May. A scoring facility was added so that finite matches could be played, making it easier to limit the time any one person spent at the controls. To provide for the crowds that we (accurately) anticipated, a large screen laboratory CRT was attached to the computer to function as a slave display. Perched on top of a high cabinet, it allowed a roomful of people to watch in relative comfort.

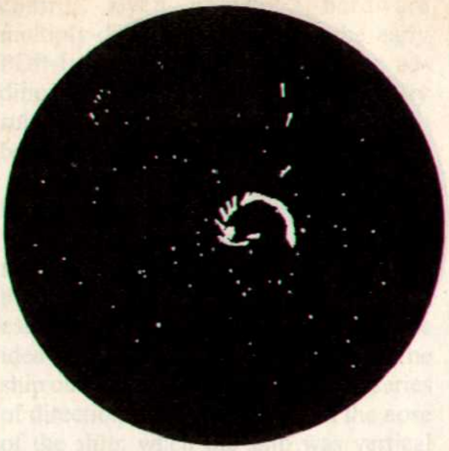


**Figure 6, A common mid-game flourish—and don't ask about G-forces!**

Also in May, the first meeting of DECUS (Digital Equipment Computer Users' Society) was held in Bedford, MA. At that meeting I delivered the first paper on the subject, pretentiously titled "SPACEWAR! Real-Time Capability of the PDP-1."

Over the summer of 1962, the original Spacewar hackers began to drift away. Alan Kotok and I went to work for Digital. Steve Russell followed John McCarthy to Stanford University. Peter Samson and Bob Saunders stayed in Cambridge for a while, but eventually they too, went west. Dan Edwards remained with the AI group for a few years, then moved to Project MAC. Jack Dennis and the PDP-1 also wound up at Project MAC, which evolved into MIT's Laboratory for Computer Science. Others took up the maintenance and development of *Spacewar!* Program tapes were already showing up all over the country, not only on PDP-1s but on just about any research computer that had a programmable CRT.

### A Mystery, Just For Good Measure

Slug tells me that there is a Lost Version of *Spacewar!* There would be, of course. He says the game is pretty much like the original, but the scoring is much more impressive. After each game of a match, cumulative scores are displayed as rows of ships, like a World War II fighter pilot's tally. Slug says he saw this version for a short time on the PDP-1, but never found out who produced it or what became of it.

### Twenty Years Later

The original Spacewar PDP-1 was retired in 1975 and put in storage at DEC's Northboro warehouse, where it serves as a parts source for the similar machine now on working display at Digital's Computer Museum in Marlboro, MA. At this writing, DEC engineer Stan Schultz and I are trying to put the original *Spacewar!* back into operating condition. So far, all attempts at finding the original control boxes have been futile; we will probably build replicas (the plastic Atari joysticks we have now got no class).

Dan Edwards still works for the U.S. Government, developing computer security systems. Alan Kotok is still a consulting engineer with DEC. Peter Samson is now director of marketing for Systems Concepts, Inc., in San Francisco. Bob Saunders had gone to Silicon Valley, where he is an engineer-programmer for Hewlett-Packard.

Jack Dennis is a Professor of Science in the Electrical Engineering Department at MIT.

John McKenzie, the chief engineer, is retired, but over the past year or so has been helping to restore the TX-O and PDP-1 to life at the Computer Museum.

And what of the Hingham Institute? Wayne Wiitanen has recently become a Senior Research Scientist at the General Motors Research Laboratory, where he is happily designing eyes for robots. Slug, after various adventures, is now a programmer-analyst for Interactive Data Corp. in Waltham, MA. I am reduced to writing for a living, but tend to act somewhat less superior therefore.

*Spacewar!* itself has bred a race of noisy, garishly-colored monsters that lurk in dark caverns and infest pizza parlors, eating quarters and offering degenerate pleasures. I think I know a few former hackers who aren't the slightest bit surprised.

### Acknowledgements

I was able to reach all of the original *Spacewar!* perpetrators, hackers and Hingham Institute Fellows alike. Not to mention Professors Dennis and Minsky, and John McKenzie. In addition, I am grateful to Marcia Baker, Professor F. J. Corbato, and Professor R. M. Fano, all of MIT, for help with dates and places, and other facts. The help was theirs; any mistakes are mine. ■

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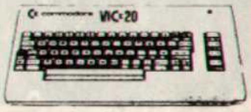

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# Apple Computer Games

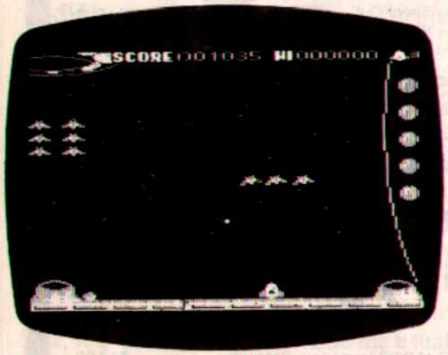
By David H. Ahl, Andrew Brill, David Lubar, Michael Coffey and Dale Archibald

## Bandits

At the start of play in *Bandits,* you have a group of five items (fruits, vegetables, etc.) clustered at the right side of the screen. Alien bandits then come in and assemble at the left side of the screen outside the reach of your laser cannon. After they have assembled, they take off in various formations, flying and swooping about the screen, raining bombs upon your base at the bottom and making for your goods at the right.

At your disposal, you have a laser cannon which can blast the aliens into smithereens and you have shields which can protect you from their bombs.

*Bandits* has 28 levels of play; each level has a different group of items on the right and features a different combination of bandits that go after your goods.



You score 100 points for each supply item remaining after obliterating all of the bandits in an attacking wave. For each level you advance, you pick up an additional 100 points for each remaining supply item (maximum 500). If the bandits steal all of your supplies, the game is over.

You begin with five ships and are awarded a bonus ship for each 5000 points.

Shields are a mixed blessing. While they provide total protection against bandit fire or bombs, you only have a limited amount of shield energy. Shield energy is totally replenished with each new ship and slowly replenished during sustained play when the shields are not in use.

The variety of attack formations and aliens is staggering. Indeed, they cannot all be stored in memory at one time; thus, the disk must be kept in the drive so that each attacking formation can be loaded as play proceeds.

The game may be played from the keyboard which uses the right and left arrow keys for movement, space bar for firing, and "S" for shields. We found this the least satisfactory method of play. Far better was a paddle or joystick with the knob (or stick) for movement, button 0 for firing, and the space bar for shields. Even better, was a switch-type (Atari) joystick attached to a Sirius Joyport. Joystick movement controls the base, while the button fires your laser and a forward tilt of the joystick activates the shield. We longed for a continuous fire feature, similar to the *Centipede* arcade game or its Apple look-a-like, *Photar*.

The high score of *Bandits* is saved each time the disk is booted up, however, it is not permanently recorded. We wish it were along with the player initials.

Nevertheless, despite these criticisms, we found *Bandits* great fun. If you are looking for nonstop action, look no further; this will give you your fill.—*DHA*

## Castle Wolfenstein

After the almost endless list of tedious instructions for playing *Castle Wolfenstein,* an Allied prisoner shows up in the first room of a maze of adjoining rooms that is guarded by Nazi soldiers. The mission is to maneuver the Allied soldier past cruel Nazi guards and sadistic SS stormtroopers, recover the secret war plans, and escape the deadly confines of *Castle Wolfenstein.*

Armed with a gun loaded with ten bullets, the Allied captive attempts to kill Nazi guards who scream with piercing shrillness when shot. After shooting a Nazi, the prisoner can search him for such goodies as bullets, grenades, and door keys by standing over the dead body and pressing the space bar. However, the prisoner can take bullets from a dead guard only if the guard's clip contains more than the prisoner's supply. Sometimes a guard will surrender to the prisoner when an empty gun is pointed at him from point-blank range. Then the prisoner can search the guard and shoot him with his own ammunition.

Once the pesky Nazis are eliminated from the first room, the prisoner can search the supply chests that are located in most of the rooms. The contents of these chests enable the prisoner to replenish depleted supplies of bullets and grenades; he may also find Nazi uni-

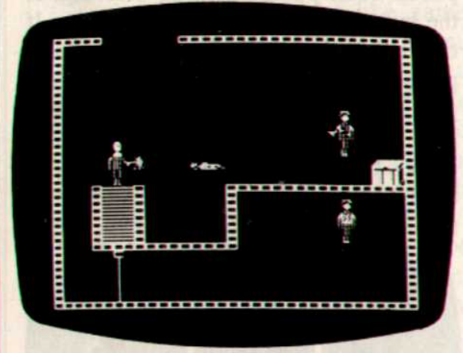
| Game** | Price | Manufacturer |
|---|---|---|
| Bandits | $34.95 | Sirius Software |
| Castle Wolfenstein | 29.95 | Muse |
| Choplifter | 34.95 | Broderbund |
| Falcons | 29.95 | Piccadilly |
| Gold Rush | 34.95 | Sentient |
| Int'l Grand Prix | 29.95 | Muse |
| Jaw Breaker | 29.95 | Sierra On-Line |
| Juggler | 29.95 | IDSI |
| Microwave | 34.95 | Cavalier |
| Neptune | 29.95 | Gebelli |
| Nightmare Gallery | 34.95 | Synergistic |
| Photar | 19.95 | Softape |
| Rear Guard | 29.95 | Adventure International |
| Ricochet* | 19.95 | Automated Simulations |
| Snack Attack | 29.95 | Datamost |
| Sneakers | 29.95 | Sirius Software |
| Swashbuckler | 34.95 | Datamost |
| Threshold* | 39.95 | Sierra On-Line |

*See game review in Atari computer section **All games require 48K forms and bulletproof vests. Once the prisoner is wearing the uniform and vest, he can wander from room to room unnoticed by all Nazis except the SS men.

The SS stormtroopers are particularly nasty. They are hard to destroy, and it usually takes a direct hit from a grenade to kill them. Often, a missed attempt at killing a stormtrooper spells a quick, sure end for the Allied prisoner.

Once the prisoner has a full supply of ten bullets, three grenades, and is wearing the uniform and vest, all he needs to complete his escape are the war plans. But the road to escape is long and hard, and blocked by ruthless Nazis.

The most frustrating feature is the length of time it takes to escape. This is due mainly to the time it takes to open the supply chests. Even more frustrating is waiting a long time for a chest to open only to find that it contains something completely useless like sauerkraut, bratwurst, or schnapps.



With a little luck and a lot of patience, you can escape from the castle. If you are lucky enough to escape with the war plans, you will be promoted in rank; if you escape without the plans, you may or may not be promoted. With each escape, the layout of the castle changes and escape becomes more difficult.

*Castle Wolfenstein* can be played with a joystick or paddle, or a keyboard. The joystick allows for the easiest maneuverability, while the keyboard is the most difficult of the three controls to direct movement.

*Castle Wolfenstein* may be a little slow to play, but the thrill of the escape is worth the wait. *Auf Wiedersehen!—AB*

## Choplifter

The Bungeling Empire is Broderbund's favorite adversary. In *Starblazer* the player attacked it with a WWIII jet. The scenario has changed for *Choplifter*, and I'll let you select which country might best represent the Bungelers today.

The Bungelers have taken 64 hostages from the U.N. Conference on Peace and Child Rearing and crammed them into four barracks near the eastern border.

You, the leader of the Sanguinistas, have a helicopter with enough parts for three missions. It is loaded with unlimited fuel, bombs, and rockets.

From your command post (a U.S. Postal Service distribution center) just east of the boundary line, you receive word that one of the barracks has exploded and caught fire. The hostages are running free temporarily, looking for help. This may be your chance.

Lifting off in your helicopter, you hit one of the buttons—the movement button—on your joystick. This spins the chopper around to face west. Push the second button and you fire in the direction you are facing to test your guns.

Pressing the movement again and holding it, you swing all the way east. A short jab at it turns you halfway back, perpendicular to the sentry moon.

Tilt the chopper in the direction you want to go, and you flutter across the border. A Bungeling tank, green against the pink sand below, fires helplessly at you. (It might sound like odd camouflage, but in black and white, the tank is almost invisible.)

You see a hostage waving at you, and another. An enemy tank outraces them as you start to set down. Pull the joystick back, and you lift up again.

You are perpendicular to the tank so you can drop bombs while it moves back and forth firing. Ease the stick over and push the fire button as fast as you can. The bombs fall and explode with noise and flare on the surface until you hit the tank. All is quiet again for a while.

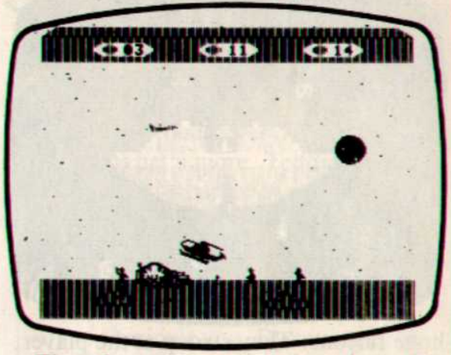
You land, level the chopper carefully, and watch the hostages come running to your craft.

The animation in this game is amazing. The helicopter lifts and tilts, the ¼″-tall hostages wave and run, jets come in and turn to fire two rockets, fires and explosions rage . . . the American flag on the distribution center even appears to wave in the electronic breeze.

Once you have landed the first 16 hostages, you must decide how to free the remaining groups so that you can load and save them.

Dan Gorlin's program is impressive. The joystick controls are touchy enough to make a novice bounce the 'copter around like it's doing the pogo. The movements of the little hostages are correct down to their wave from the P.O. after they have been freed.

Even the way the jets peel off and fire their miniscule missiles is well done: the aircraft get larger as they get closer and turn into their attack run. The three-dimensional effect is very good.



The player's score is based on the number of hostages safely freed. At the top of the screen are displayed the numbers which tell how many hostages have been killed, how many are aboard the airship, and how many are safely at the distribution center. There is nothing to be gained by blasting tanks, jets, or the smart bombs.

Tanks can only hit the 'copter when it is on the ground loading escapees. The jets can occasionally hit the copter on the ground, and often in the air. The smart bomb will ram in the air, or rain bombs if the craft is loading. You can also fly right into the ground, if your aren't careful.

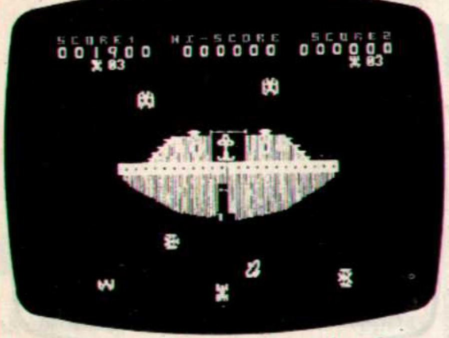
While you try to save them, hostages will be mowed down by tank fire, rockets, or bombs. They can also be squashed by the helicopter if you aren't careful, or hit by the blade if the machine isn't firmly on the ground.

It is an unusual concept carried out well.*—DA*

## Falcons

An arcade game dealing with a certain mythical bird has found its way to the Apple in the form of *Falcons*. The game seems fairly easy for the first ten seconds or so. Several rows of ships move above the player, firing down at his base. This part is reminiscent of Invaders. Then a few ships break formation and swoop down. Now it seems a bit like Galaxian. The similarity vanishes as the attacking ships begin to fly in strange patterns, moving below the screen and attacking the player from below. A transformation suddenly occurs. The ship changes to a falcon and flies evasive patterns. It's worth more points now, but harder to hit.

If the player clears the field, he gets another with a different formation. After this second field is cleared, the hard part begins. Small blue dots appear on the screen, weaving back and forth. They start to grow, becoming large dots, then huge falcons. They swoop at the player, moving at high speed. If hit straight on, the falcon is destroyed. If only winged, it returns. If the player gets through this field without losing his allotment of three ships, he gets a second field of dots that grow into falcons. Survivors are given a chance to destroy the mother ship. Make that MOTHER SHIP. The thing is huge. To destroy it, the player first has to blast a hole through the bottom. Next, a hole has to be made in a revolving rim. Once there is a clear path for a shot to the inside, the ship can be destroyed. But the mother ship shoots back. And groups of small ships hover above it, swooping down on the player. If the player destroys the mother ship, the game cycles back through the five levels again.



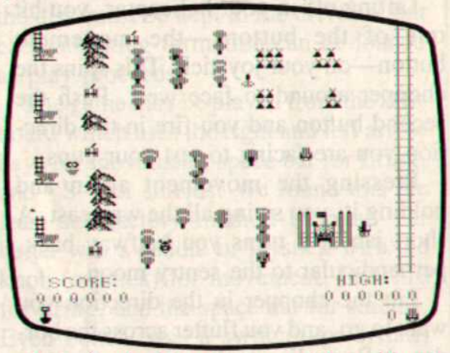
Beside firing, the player has the option of using shields. A shield lasts for about four seconds, then can't be used again for about five seconds. Shields are great for destroying swooping falcons since the birds are killed on contact with the force field. The game can be played with keys, paddles, or a joystick. There was one rough edge noticeable when fighting the mother ship. Occasionally, one of the attackers wouldn't be entirely erased from the screen when destroyed. But this barely detracts from the appeal of the game. *Falcons* is tough, fun and very well done.—*DL*

## Gold Rush

In this game, a train chugs into a station on the center right side of the screen. A prospector (you) gets off and from there on, it is up to you to make your fortune in a wild west gold town.

Scattered thoughout the countryside are bundles of TNT. You stake a claim by picking up a bundle of TNT and placing it in one of the four mines in the left side of the screen on top of an ore cart. In moving around the town and adjoining countryside, you must avoid the Indians, cavalry and bears. There is also a claim jumper who will leave you alone if you aren't carrying any TNT, but if you are carrying it and run into the claim jumper, he will steal the TNT and place it back in its original spot.

You must also watch for bonus objects (shovel, pick, hammer, and scales) which appear in the Indian village. If you pick up one of these objects and then stake a claim, you will receive an appropriate bonus between 100 and 350 points. Each claim that you stake without a bonus object is worth 400 points. There are also three mystery bonus objects which are worth various numbers of bonus points.



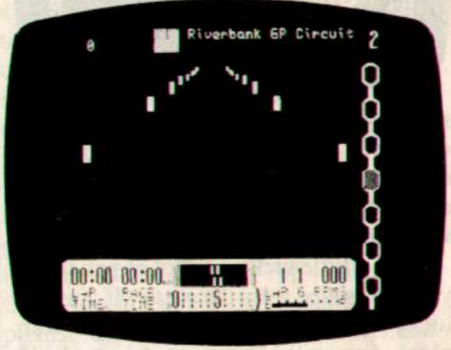
After successfully staking eight claims (two screens), you are entitled to a bonus round. You get 60 seconds to work four mines while avoiding the three insane claim jumpers. If you succeed, you are awarded an extra man.

The game may be played from either the keyboard or with a joystick. From the keyboard the I, J, K and M keys are used to move up, down, right and left. We found the game considerably easier to play using a switch-type joystick with self-centering. In playing the game we found the bears were the most difficult to avoid while the Indian was the easiest to avoid except when you entered the Indian village to pick up a bonus object. Since the TNT is randomly located on each play of the game, it was not possible to work out successful patterns of play as one might do in Pac-Man. Rather, the game puts a higher premium on quick response and avoidance maneuvers. Some players were initially frustrated with the game until they got the hang of this method of play.

The game makes excellent use of color, graphics and sound of the Apple and it is one that can be enjoyed by players of all ages. As mentioned above, we strongly recommend a self-centering, switch-type joystick for most enjoyable play.—*DHA*

## Int'l Gran Prix

*International Gran Prix Racing* is everything an Apple game should be, and more. Written by Richard Orban, who created *Three Mile Island*, it is one of the few driving games that successfully solves the paddle problem. Namely, how can a player shift, accelerate, decelerate, and steer without getting hopelessly tangled in a jumble of paddles and keys? The solution in *Gran Prix* is absolutely elegant. The player uses only one paddle. The paddle controls steering. If the button is held, the car accelerates. If the button is quickly released and pressed, the car will shift to the next gear, assuming high enough engine revs have been reached. Releasing the button causes the car to decelerate. During deceleration, a press and release of the button is used for downshifting. If the player desires, he can switch to automatic transmission. There is even a cruise control.



All this merely scratches the surface of an excellent game. The program is basically a road race game, similar to the arcade game *280-ZAP*, where the screen displays roadposts flashing by the car. The icing on the cake comes in the form of five Gran Prix courses. At the start of the game, the player selects a course, then chooses the number of laps he wants to drive (from 1 to 10). Next, the amount of fuel is selected, followed by the skill level. There are eight levels. At the easiest, the car barely drifts; in middle levels, it skids; at the top level, the road turns to Teflon.

The dashboard display includes speedometer, tachometer, a timer for current lap and total time, and indicators showing the relation of the tires to the posts. Whenever the car moves dangerously close to the posts, a clicking warns the driver. Collisions are accompanied by a weird sound that seems to defy the limitations of the Apple speaker. The player's best lap time and total time for any course and skill level are stored and displayed by the game. All the curves have names, and these names are displayed on the screen when the car approaches.

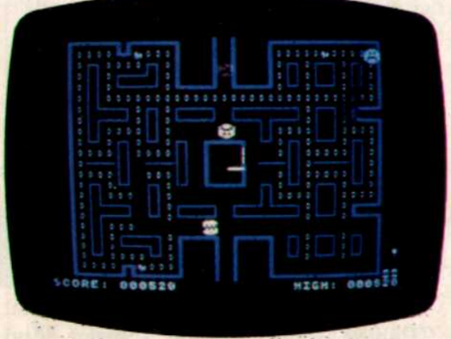
Beyond great graphics and superb design, the game also simulates driving with nearly total realism. Whatever algorithms the author used, he did a good job. The car handles very accurately. It can accelerate through curves, go into controlled skids, and fishtale if the player oversteers. *Gran Prix* is a winner.—*DL*

## Jawbreaker and Snack Attack

These are both PacMan-like games with the object of negotiating a creature (a fish in *Snack Attack* and a set of teeth in *Jaw Breaker)* around a maze eating up small dots, fruits, candies, and other goodies. The player creature is pursued by meanies which are released periodically from the center of the maze.

Both games have special colored dots located within the maze that, after being eaten, render the creatures chasing the player harmless at which time he can catch them and eat the meanies.

Upon clearing the entire board in *Jaw Breaker* the player is rewarded with a toothbrush that brushes the player's teeth and makes them "strong and clean" because in the next maze the predatory creatures are quicker and don't stay vulnerable for as long.



**Jaw Breaker.**

Upon clearing the maze in *Snack Attack,* the player is rewarded with a new kind of maze of which there are several.

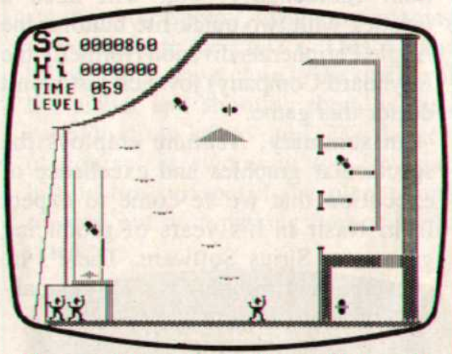
Needless to say, the people who own the coin-op rights to PacMan are unhappy about this type of game and have taken legal action against some of the companies manufacturing them. However, the last time we checked both of these were still on the market and, for PacMan fans, either is recommended.—*DHA*

## Juggler

We read in the rules that "*Juggler* is an exciting, fast action game, in which you try to accumulate a high score by juggling various types of objects. You are given three jugglers for each game and one extra juggler may be earned by reaching 100,000 points."

On the left side of the screen is a launcher similar to a pinball plunger. It launches balls and other "tumblers" into the air where they careen off a small inclined plane and hit objects the juggler is tossing into the air or the juggler himself.

In the beginning, the juggler has large objects, pizza pans perhaps. But as the game progresses the juggler's objects get smaller and smaller and don't go as high, thus it becomes more difficult to keep the tumblers in the air.



There is a chute at the left side of the screen. If an object enters this chute it is launched out of the bottom at high velocity back up into the fray. Eventually, when tumblers are collected on a maze of shelves at the left side of the screen next to the launcher, they work their way down to the bottom where they are again launched. After the player has successfully kept all the tumblers in the air for 90 seconds the screen flashes signalling that a new level has been reached and the action continues.

*Juggler* can be played from either the keyboard or paddle (or joystick). From the keyboard, *Juggler* can be played in "auto-toss" mode. This means that the objects used to help the juggler keep the tumblers from hitting the ground are constantly tossed in the air. Alternatively, the objects may be tossed manually by pressing the paddle button or any key.

There are seven levels of play in *Juggler.* The number of points you obtain per hit is based on the level at which you are playing. Each hit scores at 30 times the level. Bonus points are obtained when the tumblers are forced into the maze at the right or the chute at the left. An extra 500 points are obtained whenever the juggler, himself, hits a tumbler.

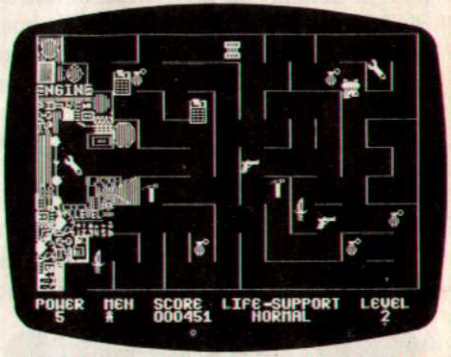
All the members of our playing panel found the game absolutely delightful and unlike anything else currently on the market.—*DHA*

## Microwave

Watch out Pac-Man. Teddy, the salvage man, does everything you do and more. What's more, Teddy is cuter than you. Teddy is part of a very original maze game called *Microwave* by Jay Zimmerman and James Nitchals.

Teddy's mission (and yours) is to clean up spaceships while nasty bad guys try to eliminate you. By setting up microwave dishes, you can arrange for the bad guys to be demolished. Each time you finish with a spaceship, a different one appears.

While Teddy runs around spaceships, *Microwave* plays music, changing its tune frequently. This music can hook whole rooms full of people into fighting over who plays next.



Teddy responds to either the keyboard or the joystick. He pays better attention to the joystick, taking corners and backing up as promptly as any character we have seen.

Simple objects on the screen include wrenches, knives and calculators. Each maze is full of these until you collect them all. Other objects include power packs and pineapple bombs.

Picking up a power pack enables Teddy to deploy a microwave dish at will. Stepping on a pineapple at the wrong time makes Teddy go bye-bye.

Microwave dishes are the key to advanced play and high scores. The bad guys react to a microwave dish the same way our cat used to react to the microwave oven: They stay away because they know what is good for them.

Teddy can walk through the microwave unscathed. You must learn where and when to deploy the dishes. You possess a limited number of them and each one is good for only a limited time.

The subtleties of the game will please the most experienced game freaks. You will play several rounds, for example, before learning how the hand grenades work. You may play several more before figuring out the use of the microwave dishes.

We heartily recommend *Microwave* to the casual as well as the demanding gamer. The graphics, responsiveness and sound effects are all excellent.—*MC*

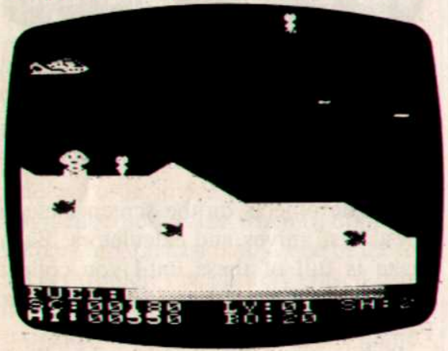
## Neptune

In *Neptune,* you are the Commander-In-Chief of the navel vessel, Neptune. Your mission is to seek and destroy enemy robot amphibians that have inhabited neutral waters.

Although you are commanding a submarine and the theme is nautical, *Neptune,* in reality, is another version of the arcade game, Defender.

Your submarine is traveling from left to right (actually the underwater terrain is scrolling by from right to left). As you travel along, small purple robots bounce from the top to the bottom of the screen and back again. In addition, cute little white faces with large red bow-ties bob about on the ocean floor.

Purple robots may be shot with your laser beam while the bobbing creatures must be trapped with depth charges dropped on top of them. After going through a group of these nasties, you come upon some "flying" saucer type of underwater vessels moving rapidly from right to left. These can be either avoided or shot (for 80 points each).



You then encounter a large cave (no nasty creatures). Unfortunately there is only one way through the cave and you must choose it long before you can see whether it is the right one. A little ESP, or just plain guess work is helpful here.

Following this, you enter a narrow cave containing vessels that cannot be shot. Here, you need quick reflexes and peripheral vision to see what's coming on the screen from the right both in terrain and enemy vessels as you stay toward the left center of the screen.

Get through the cave, and you can finally dock at your fuel station. Whew! Move your ship downward and to the right, and you're on way to a higher level, which is characterized by less maneuverability, changes in the underwater environment and aquatic life, and a faster pace.

The high score after each boot-up is saved, but high scores are not saved to the disk. All the members of our playing panel strongly preferred the joystick option. Incidentally, you will need a joystick with two quick fire buttons; the Apple Peripherals division (formerly the Keyboard Company) joystick just won't do for this game.

In summary, *Neptune* employs the spectacular graphics and excellence of execution that we've come to expect from Nasir in his years of producing games for Sirius Software. There's no question, that *Neptune* has all the makings of another big winner!—*DHA*

## Nightmare Gallery

Good evening. I'd like to welcome you to *Nightmare Gallery*. We have assembled a small group of funloving guys and ghouls to . . . recruit you.

Our playful little group's desire is to have you join us, permanently. We can't understand your reluctance, and will try to persuade you. Won't you join our party?

You, with your filthy pistol, must try to shoot us as we gambol from tombstone to mausoleum. As we dance from row to row, your fire retires us to whence we came. Strike a fleabitten werewolf; he turns into a mossy tombstone. A handsome vampire bat, however, becomes a striking mausoleum.

Luckily for us, these monuments stop your fire. Oh, you'll chip them away as you continue shooting, but others are built by the mummies and the falling ghosts the ghouls drop. The mummies walk from the top of the screen down toward you, leaving columns of monuments; the ghosts plummet, also adding monuments.

If you hit a ghost as it falls, you won't kill it, but you may gain extra shields. Bullets ripping through the mummy can destroy the monuments it replaces, although the mummy won't be harmed.

As for the rest of us, the werewolves dance from column to column. Two columns side by side give them the shortest path. Should the columns be separated by a space, they will be forced to cross that space, targets for your fire.

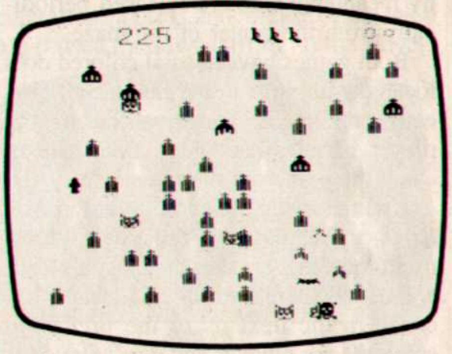
Vampires fly down toward you leisurely. Either species may, with a cheery shriek, embrace you and your pistol if they successfully reach the bottom of the screen. The mummy and ghost must fall on you for the happy conversion.

Oh, you can foil our recruiting efforts for a while if you wish to be a spoilsport, by using one of your shields. While it lasts, however, you can't shoot.

You'll even earn extra pistols at three different levels for decimating our ranks.

When at last we gather you into our fold, you will be able to leave a permanent record of your foolish struggle for posterity. If you tire during the fight, you may pause. But should you hesitate during the fight . . . you'll be retired.

This is splendid Halloween entertainment all year around. Concept and execution are hilarious, and the package cover featuring Robert Clardy and Ron Aldrich's names is excellent.



Oops. I see the sky beginning to lighten in the East. Our little band must leave you now. Don't relax, though. We'll be back again.—*DA*

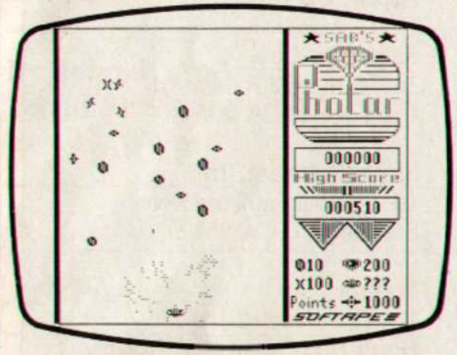
## Photar

We are told on the packaging that "*Photar* is fast. *Photar* is mean. And *Photar* is out to get you. You know the moment the black holes appear that you are in for a lot of trouble. Then comes *Photar,* undaunted by your ceaseless fire. Soon the rings of Saturn doggedly hound your every move, moving in then backing off, while wild stars come screaming in for the kill."

It all sounds like something out of a marvelous science fiction adventure. And, perhaps a new concept in games. However, what we really have here is a close cousin of the popular coin-op game, Centipede.

However, instead of the Centipede coming in as a continuous worm-like creature from the top of the screen and weaving back and forth, it comes in as formations of "alien" ships.

The spider is replaced by another ship at the bottom of the screen and, occasionally a fast-moving ship careens down from the top of the screen leaving mushrooms—sorry, black holes—in its path. Incidentally, you get only one base in *Photar*.

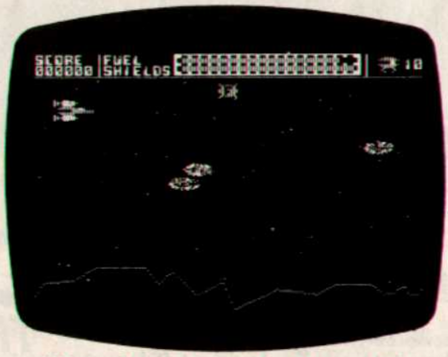


Obviously, Softape is trying to make this into a distinctly different game from Centipede and they have largely succeeded while retaining all of the fun and attraction of the coin-op arcade version. The only real complaint that we have about *Photar* is that it is rather wearing on your firing finger even though the game has a continuous fire feature similar to the one on the coin-op Centipede games. A Trak Ball controller would be nice too, although a short-throw joystick does just as well. We found the keyboard play option absolutely impossible; a short-throw non-centering joystick is by far the best bet. *Photar* uses relatively little color, but the sound effects are outstanding.—*DHA*

## Rear Guard

*Rear Guard* is loosely based on the arcade game, Defender. In it, you are flying a spaceship from left to right across the screen (actually the ground and other objects are scrolling from right to left giving the illusion of flight). In the game, it's you against an armada of alien ships of different types. Five ships come at you from the right and are worth between 25 and 200 points. A freighter flies in the same direction as you (left to right) and is worth 300 points. In addition, a satellite identified by an F on its side that later changes to an S flies by. Hitting the satellite while it displays an F gives you a fuel recharge, while hitting it with an S gives you a shield recharge. The level of your fuel and shields is shown at the top of the screen along with the score and the number of LGG's remaining.

LGG's? Yep. The object of the game is to survive by preventing the ground-based LGG's (Little Green Guys) from collecting the orange energy pods that are dropped by destroyed alien fighters. These pods are vital because they can be traded in at the end of each game level for fuel, shields and/or bonus points. If you are like me, and constantly run out of fuel, you will want to trade your pods for additional fuel. The players on our panel tried different strategies, but whatever strategy you employ, the important thing is to eliminate the LGG's. This is done by swooping down close to the surface of the planet and shooting them as they speed by from left to right. The danger, of course, is swooping too low and hitting the surface of the planet, and missing out on a passing fuel or shield satellite.



Although it is theoretically possible to play the game with the keyboard or paddles, we felt that to maintain your sanity, a joystick is necessary. In summary, *Rear Guard* is a fast-moving, colorful game that brings Defender home to the Apple. The game saves the top ten scores and player names, a thoughtful touch that we applaud. Also thoughtful is the policy of Adventure International to furnish a backup disk at the cost of $3.99.—*DHA*

## Sneakers

*Sneakers* is another shoot 'em up game in which the player controls a "base" which moves across the bottom of the screen from left to right under control of the paddle. The paddle button is used to fire missiles into the air. However, instead of alien raiders or space ships, *Sneakers* offers an assortment of seven interesting, playful creatures which fly, bounce and attack the players. The first creatures are four "Sneakers" (half circles with little legs and sneakers on their feet). They bounce around the screen and occasionally drop down to the bottom where they attempt to trample the player base, and then jump back up to the top and bounce around there.

They are followed by flights of Cyclopses which come from left to right across the screen and drop lower on each pass. After he eliminates all the Cyclopses, the player is faced with missile-launching Saucers. These are followed by Fangs (little bird-like creatures which can turn into a bevy of Fangs which drop down to the bottom of the screen).

The next "creature" is an H-wing fighter which, by unanimous consent of our player panel, is the second most difficult to eliminate. Few players were able to eliminate all the H-wing fighters with just one base. These are followed by large and small meteors, then Scrambles (descending triangles which change direction when fired upon), and finally by "Scrubs" (diagonal, fast-flying missiles that all of our players agreed were the most difficult to eliminate).

Nevertheless, *Sneakers* was judged as a fun game even by players who scored in the 100 or 200 range.—*DHA*

## Swashbuckler

If you like stabbing people or small animals, this game is for you. No kidding, *Swashbuckler* is a game whose object is to kill people with a sword. The more you kill, the better your score.

You would be surprised what a good feeling it is to see your opponent fall into a heap on the floor. Just wait 'til you see the variety of opponents: you'll find a one-legged man, a snake, a caveman, a medieval bad guy and countless others.

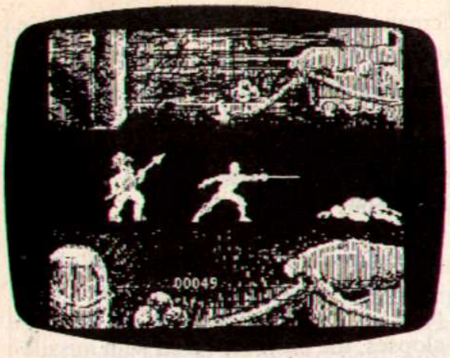
Even the scenery changes as you master the key strokes that control your animated swordsman. As you gain dexterity with the controls, the bad guys will invade your space with greater frequency.

*Swashbuckler* animates up to three men at a time. You control the central figure. The other two will wave their arms, swords or clubs at your man.

The early opponents show few skills. They sidle up to you and hack away. The only difficulty lies in their relentlessness.

After you multilate a few fellows, a new character emerges. He's a snake and you won't know how to kill him. You have to learn a new maneuver.

By the time you have extinguished



about twenty lives, the party will liven up unmercifully. You will greet a new guest within two seconds after disposing of an older one.

While you are dueling, one or two scorpions, rats, or other animals may appear. Each species wreaks a different brand of havoc. Some cause instant death, other merely cripple.

You control your man with various letter keys. He can move left, turn around and move right. He can stand on guard, move his sword up or down, thrust it or lunge.

*Swashbuckler* is creatively animated with good responsiveness and gradually increasing difficulty. For those who feel lost in space, it's a good change of pace.—*MC* ■

## Manufacturers

**Adventure International**
P.O. Box 3435
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**Automated Simulations**
1043 Kiel Court
Sunnyvale, CA 94086

**Broderbund Software**
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**Cavalier Computer**
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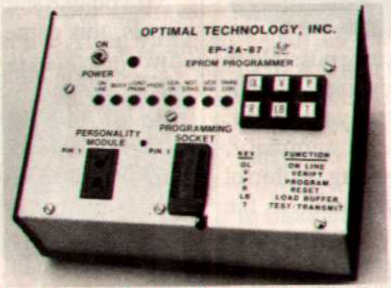

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# Atari Personal Computer Games

By John J. Anderson, David Small and Eric F. Wolcott

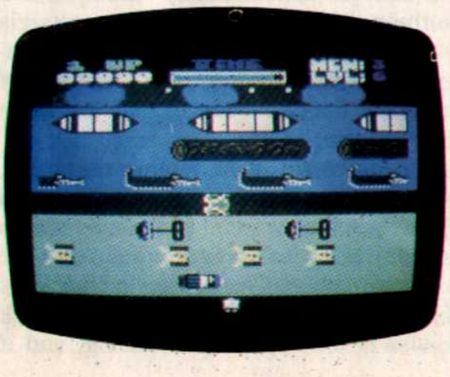
## Preppie

Already a minor classic, *Preppie* is along the theme of Frogger but with a beautiful difference. Now the intrepid adventurer is no longer an amphibian but a prepster, right down to the tiny alligator on his polo shirt. In this game, though, the alligator gets a shot at revenge.

Your job is to recover wayward golf balls that have been hit into the rough. And when I say rough, I mean really rough: you must avoid speeding golf carts, bulldozers, lawn mowers, and gigantic frogs (the irony of it all), in your quest. You must also leap canoes, logs, and alligators in order to negotiate the water hazard.

Although the concept underlying the game is far from original, the implementation is gorgeous. Author Russ Wetmore has created a colorful, fast-moving display, and added to it a musical soundtrack which takes full advantage of the capabilities of the Atari. Not one but three separate tunes will have you singing along in short order, even as you march inexorably toward doom. The pace starts out rather leisurely, but doesn't stay that way for long. Don't even graze an ankle—you'll end up flat as a pancake underneath an adversary.

Preppie.



Completion of a screen results in a more difficult screen, which must be negotiated at a faster pace. A clock at the top of the screen ticks off the precious seconds. Unless you retrieve all the balls on a screen before the clock winds down, you will automatically lose a life.

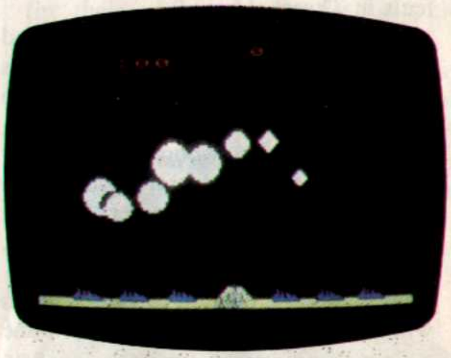
*Preppie,* is addictive, humorous, and maddening—an unbeatable arcade combination.—*JJA*

## Missile Command

This a popular arcade game in which an evil foreign power launches a missile attack against the area you defend. You command anti-ballistic missiles, which you shoot to intercept the incoming missiles, satellites, planes and smart bombs.

In the arcade version, a "trackball" is used to move the cursor for aiming. It allows very high speed movement, and very sensitive positioning. (For example, hitting a "smart missile" exactly on its position is required to destroy it; otherwise the missile dodges). Since Atari has not yet released its trackball, a joystick is used.

Sound effects include an "air raid siren," various explosions, and so forth. They are quite familiar to anyone who has played the arcade game, and make good use of the Atari's capabilities.



Missile Command.

Visual effects are also rather well done. There are no longer three missile bases controlled by three buttons, as there are in the arcade version. Instead, there is one, with "underground reloading" which enables it to be destroyed, yet pop up with new missiles a bit later. There are three missile bases in one, all controlled by the joystick button.

| Game | Memory | Price | Manufacturer |
|---|---|---|---|
| Bandits* | 16K | $34.95 | Sirius Software |
| Caverns of Mars | 24K | 24.95 | Atari |
| Choplifter* | 48K | 34.95 | Broderbund |
| Deluxe Invaders | 16K | 34.95 | Roklan |
| Jaw Breaker* | 16K | 34.95 | Sierra On-Line |
| K-Razy Shootout | 8K | 49.95 | CBS Software |
| Missile Command | 16K | 39.95 | Atari |
| Preppie | 16K | 29.95 | Adventure International |
| Protector | 32K | 29.95 | Synapse |
| Rear Guard* | 16K | 19.95 | Adventure International |
| Ricochet | 32K | 19.95 | Automated Simulations |
| Shamus | 16K | 29.95 | Synapse |
| Threshold | 40K | 39.95 | Sierra On-Line |

*See game review in Apple Computer section

## Threshold

*Threshold* is in the venerable tradition of laser-fire space wars (kill, kill, kill!) and it is superb. The alien waves in this game are ever-changing and wonderfully despicable. Your ships are armed with lasers and hyperwarp drivers that can temporarily slow down time, giving you a better chance to target the enemy. Your arsenal has limitations, however. The lasers can overheat and will shut themselves down until sufficiently cooled. You may invoke hyperwarp only once per ship, and each ship has a limited fuel supply. As for maneuverability, have you ever had the misfortune to be driving a power-steered vehicle that stalls while you're driving? That's the way the stick feels in *Threshold*.

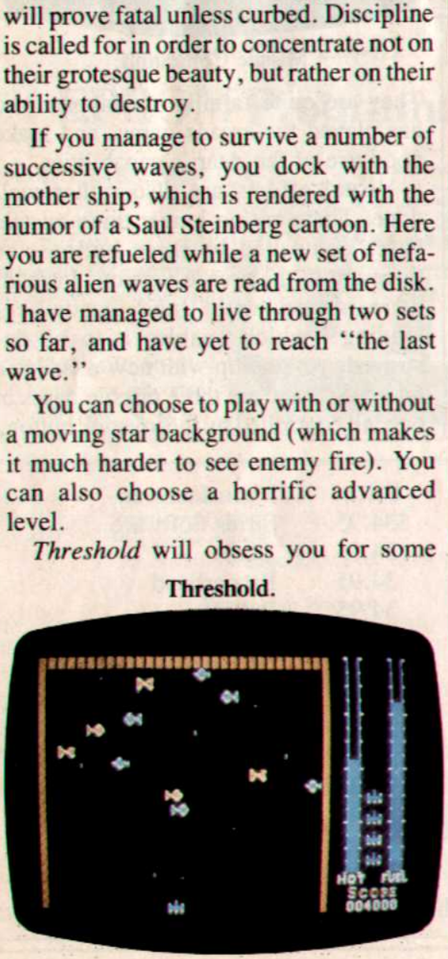
The line between utter frustration and total addiction is a thin one, and this game rides it well. The game is hard to play but you can improve a little with every game. Aliens swoop down at your ship from the top of the screen, and each wave has its own character, its own "look." Some fly in jittery formation, others billow like a flag in the breeze. Your natural inclination to gape at them will prove fatal unless curbed. Discipline is called for in order to concentrate not on their grotesque beauty, but rather on their ability to destroy.

If you manage to survive a number of successive waves, you dock with the mother ship, which is rendered with the humor of a Saul Steinberg cartoon. Here you are refueled while a new set of nefarious alien waves are read from the disk. I have managed to live through two sets so far, and have yet to reach "the last wave."

You can choose to play with or without a moving star background (which makes it much harder to see enemy fire). You can also choose a horrific advanced level.

*Threshold* will obsess you for some time. Because the aliens change throughout the game, you're primed to withstand at least "one more wave *this* time." Though my wife abhors "shoot-em-ups," even she spent a while with this one. After quite some time, I still have no reservations about *Threshold*.—*JJA*

**Threshold.**



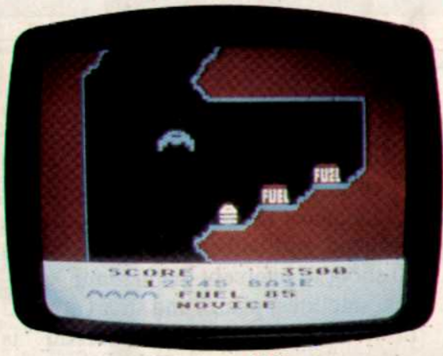
## Caverns of Mars

The *Caverns of Mars* arrived recently. I had heard rumors about this new Atari game, so I immediately sat down to play it and see what all the fuss was about.

Four minutes later, I was hooked.

Four hours later, my wife dragged me away.

The plot is as follows (some of it is somewhat cliche, as it follows the lead of many, many other games.): First, there's the Sole Defender syndrome common to many games, where you alone are responsible for saving the Moon Base (Invaders) or six cities (Missile Command) or eighteen little people (Defender) or whatever. In this case, you are responsible for destroying a Martian base. In order to do so, you must penetrate a series of caverns to the lowest level, where an explodable device sits; arm it and start the countdown (by touching it); then escape before it goes off.



**Caverns of Mars.**

The game starts with you at the top of the cavern. It begins slowly scrolling up, so you move downward. By moving the joystick right-left you can maneuver from side to side (from a central position), and by moving it back and forth, you can increase or decrease your rate of descent.

While you are descending through scenic Mars, you must destroy various installations. By pressing the joystick button, you launch two missiles downward from each side of your ship. If you hit a fuel canister (imaginatively labelled "FUEL") your fuel supply increases by 5 (of 100). If you hit other installations, you just plain destroy them. The idea is to wreak as much havoc as possible on the way down.

You can see only a limited section of the caverns. So you never know what's going to come next. You maneuver through a passageway twisting back and forth, and suddenly the screen is filled with Martian ships you must avoid, and try to blow up. But you must not collide with the ships or the wall.

If your first descent is successful you begin again. This time there are floating space mines, and force doors that open and close, and things begin to shoot back at you. Completely horizontal passages appear, requiring you to be ready for them and use nearly the full vertical screen's worth of maneuvering to get through. It gets harder and harder until you are destroyed, or somehow succeed in navigating all five caverns.

*The Caverns of Mars* has that indefinable "something" that makes it arcade-quality. Here's my best definition: When you lose in an arcade-quality game, you know why, and know how you could have done better, if you were just a little faster or if you hadn't made that one mistake. Instead of the machine causing your destruction, it's your mistake that causes it. So, of course, you want to go back and try it again, and again, and get it right, until your fingers get cramps from holding the joystick, or until you're totally frustrated.—*DS*

## Deluxe Invaders

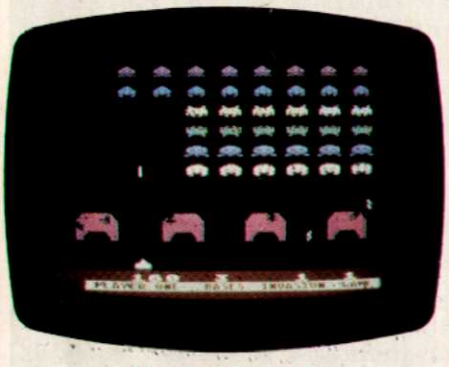
Your story may well be the same. Space invaders, the first "cult" arcade game, hooked you—you, who vehemently swore your quarters would never be in short supply. It was the drum beat that did it: the quickening pulse that glazed over your arms as you furiously raced to kill the last row of flapping insects.

Well it's been a while in coming—quite a while, actually—but the real thing is finally here. The nostalgia warms my heart. *Deluxe Invaders* faithfully captures the look, spirit, and play of arcade Space Invaders. And it doesn't stop there.

*Deluxe Invaders* retains the color, sound, and polish of the earlier Atari computer game, while remaining true to many of the features of the deluxe arcade game version. The barriers are back, as are the spinning "worm rays." Back also is the hypertensive pacing, and if you were into the game "back when," this game will go "click" when you start with it. Set aside some time.

There are nine levels of difficulty, including some where hitting an insect results merely in its splitting into two baby insects. Other levels include mother ships that deposit new aliens on the board in play. Even the alien shapes are truer to the original game, as is the difficulty.

The difficulty levels are not too well documented, and only experimentation will flesh them out completely. The program does allow for a two player game along the same lines as the coin-op.



Deluxe Invaders.

"What," you say? "Another Invaders game?" You're tired of Invaders games? I said the same thing when I first saw this package. I was wrong.

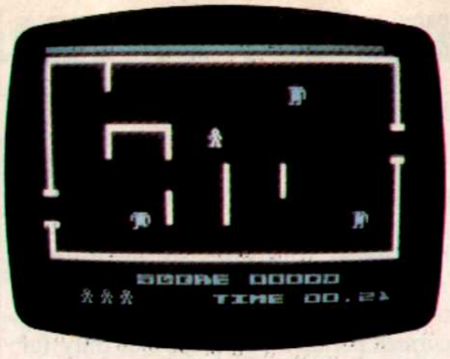
Rocklan has some exciting plans for the Atari computer, including *Gorf* and *Wizard of Wor*. They are also planning a track-ball peripheral. If these products are up to the standard of *Deluxe Invaders,* we're in for a real treat.—*JJA*

## K-razy Shootout

Among a bevy of "laser motif" games for many systems, *K-razy Shootout* brings nearly all the excitement of the arcade game Berzerk to the Atari computer. The only element that's missing is the speech. This is not to say that the Atari couldn't do it; it's simply not implemented here.

*K-razy Shootout* also bears the distinction of being the first ROM cartridge-based game from a third-party source. This necessarily adds to the cost of the package; but if you saw, enjoyed, and fondly recall the *Star Wars,* you won't want to do without this program for long.

Your character runs through maze-like chambers, as "droids" close in from all directions. Using the joystick, you aim your laser, drawing a bead on them before they do the same to you. If you manage to clear a sector, you advance to the next. The action becomes increasingly furious, and you soon find yourself shooting from the hip, moving from sheer instinct, and totally addicted.



K-razy Shootout.

Scoring is dependent on several factors, including time, ammunition used, and droids' manner of demise: through hostile fire, collision, or shooting each other. In addition, you collect an extra player for every 10,000 points.

The only way you'll see sector four or beyond is through strategy. You'll discover that it's possible to get droids to collide or shoot each other—finding good cover is also imperative. Don't collide with a wall, though. That's as fatal as being hit by enemy fire.

*K-razy Shootout* is lots of fun, and has a great deal of staying power. If only it could talk.—*JJA*

## Protector

*Protector* is one of the most polished efforts I have seen from a third party source. It is exceptionally dramatic in its graphics and sound effects, and the animation is mirror smooth.

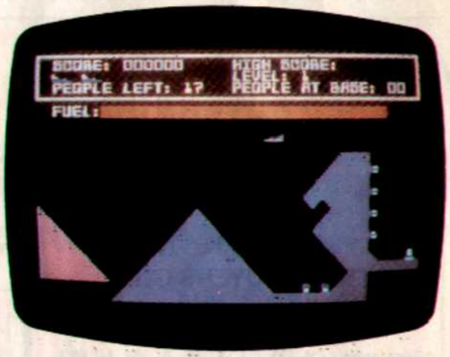
A great deal goes on in *Protector,* and mastery of the game requires a substantial amount of time. The game is roughly modeled after the arcade game Defender. As the pilot of your rocket fighter, you encounter pulse-trackers, meteroids, laser traps, a volcano, an evil alien ship, and 18 people in desperate need of your help. You must maneuver your ship so as to airlift these people from their beleaguered city to the City of New Hope, and from there to safety in an underground fortress.

You must act before they are heartlessly dropped into the volcano by the tractor beam of the alien ship, and before the volcano erupts and destroys the City of New Hope. You must also watch the fuel tank—and sometimes face the decision to refuel or to save some lives at the cost of your own. You cannot always do both.

By far the best thing about the game is the horizontally scrolling terrain graphics. The overall goal is to create a "microworld"—a fantasyland one screen high by four or five screens long. Fine scrolling and player/missile techniques are employed to a very pleasing effect. For demonstration purposes alone, this program is worthwhile. Sound effects add much to the illusion, and the title music is quite good.

The feeling of flight is accentuated as you dive to the rescue. Time ticks off as the indestructible alien saucer beams the victims up. Pulse trackers nudge dangerously close. Careful when you return fire: their favorite trick is to get you to hit innocent bystanders.

If you get all the remaining people to the City of New Hope, you can then move them through the laser field toward your goal. You must then watch for laser bases and meteroids. When fuel runs low, you must return to base to refuel. Docking can be a tricky and sometimes fatal task.



Protector.

The game is paced into six levels of difficulty, graduated to present more aggressive aliens and more complex architecture through which to navigate. The merest graze of scenery, pulse-tracker, meteoroid, laser fire, or tractor beam, and you go down in a dizzying spin. An ambulance shoots out immediately to drag you away—what's left of you, that is. Better luck with your next ship.

I have very few reservations concerning *Protector*. As soon as a level loses its challenge, you may advance to the challenge of a new level. The highest level is very tough indeed. You may get a little tired of hitting things after a while, but after all, that's your own fault, right? Next time, be more careful. —*MP*

## Shamus

*Shamus*, also from Synapse Software, takes another stride in the development of the arcade adventure. Make sure you have no pressing appointments before becoming involved in a round of *Shamus*. Once you get going, you won't want to stop for a while.

The humorous feeling surrounding the game provides much of its appeal. Author William Mataga first sets the mood, with a grand rendition of the theme from the old Alfred Hitchcock show. The player is then thrust into a complex maze of 32 rooms, containing some very diabolical nemeses. As Shamus, the player must penetrate four levels of 32 rooms each, to finally destroy the Shadow in the heart of his lair.

Don't hold your breath waiting for the completion of this goal. It is bound to take you at least a month. You see, populating each room are the Shadow's henchmen: Whirling Drones, Robo-Droids, and Snap Jumpers. The sole pleasure in their lives is to keep you from getting near their leader. And they do a job of it. You are armed with Ion Shivs, and as your opponents are always prepared to fight to the death, the action is necessarily violent.

Once in a while during your search you will encounter a pulsating question mark, the function of which is similar to "Chance" in Monopoly. By touching the punctuation mark you invite extra points and extra lives or ill fortune. I have found it hard to resist them.

To advance to a higher level, you must obtain the correct keys and unlock the correct portals. This calls not only for keen aim of your weapon, but knowledge of the labyrinthian layout of each maze. Secret passages abound, and it is quite easy to get lost. The bottom of the screen reads out a corresponding number for each room, and this is the only hint you get. I always seem to disorient myself right after unlocking a portal.

Your natural tendency is to shower attackers with ion fire. After a few games, however, you discover that fewer but better aimed shots will nearly always be a superior strategy. Keep cool, and if you find any bubbling flasks lying around, drain them: they will give you new life.

*Shamus* is a very addictive detective game. It will remain in the front of your game software collection for some time, I guarantee it. Arcade adventuring is an emergent and promising gaming category, and this program underscores that fact.—*JJA* ■

### Manufacturers

**Adventure International**
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**Atari, Inc.**
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*Continued from page 44.*

Priced in the Atari VCS range, the Emerson unit is scheduled for an initial release of 19-cartridges (incompatible with other systems), followed by at least four more. Graphic resolution of the games on display was similar to that of the VCS, and our overall impression of the game play was favorable for a system in this price range, though no cartridge stands out as being an exciting original creation.

**Colecovision.**

VIDEO GAME SYSTEM
EXPANSION MODULE INTERFACE
COLECO

**Video Space Battle.**

VIDEO SPACE BATTLE

**Vectrex.**

**Arcadia-2001.**

STAR CHESS
STAR CHESS
ARCADIA-2001
ARCADIA-2001

Of particular interest to me were two unique hardware design features that the "big guns" should note. First of all, there is a red LED which shines when the power is on. How many of us have left our consoles on overnight because we turned the switchbox back to "TV" and forgot to turn off the console?

Secondly, the Emerson joystick-keypad controller is designed so you can use the direction control either as a disc (as on the Intellivision) or as a joystick. A great idea.

### A Dedicated Video Game?

Just as the world became accustomed to programmable (i.e., plug-in cartridges) video games, Entex offers a low-cost alternative: a dedicated video game.

For about $65, you can buy a Video Space Battle, a space invaders type video game whose console looks like an oversized joystick controller, and hooks up to your TV set. The unoriginal game play aside, the tall joystick with top-mounted fire button, all on a wide base, makes for an appealing game controller.

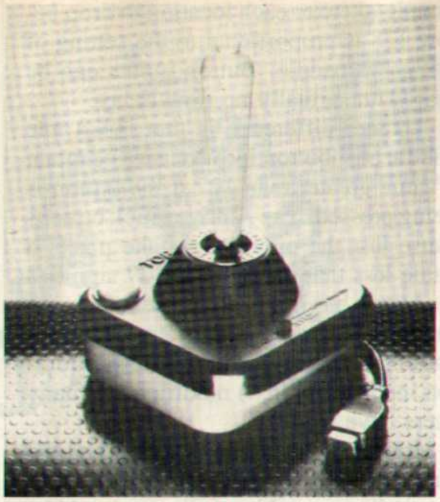
### Accessories Abound

It has taken longer than I expected, but more video game accessories appeared at the show. Of course, there have been several console covers with built-in cartridge holders (though they tend to hold less than 25% of the cartridges you own), and some of the cassette tape rack makers had adaptations for video game cartridges. There was more excitement, however, in the area of accessory controllers.

A simple, yet very practical kit for the Intellivision is a product called Injoy A Stick (from Laskey Video Distributing). Following very simple instructions on the package you swap the Intellivision direction disk for a replacement disk that also has a joystick in the center. Injoy A Stick will cost under $10 per pair.

Cynex Manufacturing Corp. displayed a prototype set of wireless joystick controllers for the Atari VCS. Each joystick unit of the Game-Mate II has a telescoping whip antenna to communicate with a control box plugged into the VCS console. Rated range is 20 feet.

Working with the prototypes, I found the reaction time, a critical factor on high speed action cartridges, to be slow, but a company spokesman said that the design was not yet finalized at the show. Target price for Game-Mate II is $79.95. Anything that can eliminate a dangling cord or two without sacrificing controller response time will be welcome.



Wico joystick controller.

You may not know the name Wico, but if you had ever played an arcade game, there is a good chance you have had your hands on a Wico joystick controller. Now, the company is branching out into the consumer field by packaging their commercial quality game controls for home video game use. Even their standard joystick gave me the feeling of more control than any other factory supplied joystick.

The unit has two action buttons, one at the upper left corner of the base and one at the top of the joystick—select one with a slide switch on the base. Other models to come include a deluxe version with a larger base, a "red-ball" type joystick and a trackball controller. Adapters will also be available for Odyssey$^2$ and several home computers.

Wico has also solved the too-short-cable problem for the Atari VCS (or 400/800 computers). Six- and twelve-foot extension cords will finally let you sit back and play Atari.

### Conclusion

You don't have to be a video game buff to see that the field is exploding with new companies and new products. The difficulty lies in making selective choices, either in new hardware or in software to support the machine you own. It is no longer practical—or possible for most—to own the majority of cartridges available for the VCS. And it is getting that way for Intellivision, too.

In choosing a new system, the controllers play a big role in your enjoyment of the games. The best graphics in the world won't help if you are always uncomfortable operating the controller.

Next, diversity of the cartridge library game play is important. The available games should cover a wide range of sports, space, fantasy, arcade, and the category of original games you use to introduce non-gamers to your addiction. The library should contain cartridges that really challenge the skilled player as well—and an ever increasing number of cartridges with fresh graphics, sound and game play, instead of re-hashing earlier games.

Selecting software for your existing system is more difficult, because individual tastes come into play, as in records or movies. But whether you are an arcade freak, a fantasy role player, a sports nut, a family cartridge devotee, or a hand-eye coordinator expert, there are plenty of cartridges to go around. Try to play the games before you buy them. Read the instructions, if they are available, to make sure the game has the challenging elements you want, or is fun for the whole family, as the case may be.

And lastly, look to future issues of *Video and Arcade Games* for both hardware and software reviews, plus news of what is going on in this fastest paced home electronics industry. ■

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**Activision, Inc.**
Drawer No. 7286
Mountain View, CA 94042

**Astrocade**
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Columbus, OH 43229

**Atari, Inc.**
1265 Borregas Ave.
Sunnyvale, CA 94086

**CBS Video Games, Inc.**
41 Madison Avenue
New York, NY 10010

**Coleco Industries, Inc.**
945 Asylum Ave.
Hartford, CT 06105

**CommaVid, Inc.**
1470 N. Farnsworth, Suite 203
Aurora, IL 60505

**Cynex Manufacturing Corp.**
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Hillside, NY 07205

**Data Age**
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Campbell, CA 95008

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Compton, CA 90220

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**Games By Apollo, Inc.**
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Richardson, TX 75081

**General Consumer Electronics**
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Santa Monica, CA 90401

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Saratoga, CA 95070

**Laskey Video Distributing**
20 Morning Dove
Irvine, CA 92714

**Mattel Electronics**
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Hawthorne, CA 90250

**MCA Video Games Inc.**
100 Universal City Plaza
Universal City, CA 91608

**Odyssey2**
I-40 & Straw Plains Pike
Knoxville, TN 37914

**Parker Bros.**
50 Dunham Rd.
Beverly, MA 01915

**Spectravision**
39 W. 37th St.
New York, NY 10018

**Starpath Corporation**
324 Martin Avenue
Santa Clara, CA 95050

**Telesys**
43334 Bryant St.
Fremont, CA 94539

**Tiger Electronic Toys, Inc.**
909 Orchard
Mundelein, Il 60060

**U.S. Games (Vidtec)**
1515 Wyatt Drive
Santa Clara, CA 95054

**Video Technology**
c/o Hirsh Co. Inc.
2633 Greenleaf
Elk Grove Village, IL 60007

**Wico Corporation**
6400 W. Gross Point Rd.
Niles, IL 60648

*Continued from page 120.*

two example programs, one in the Applesoft Basic and the other in Pascal.

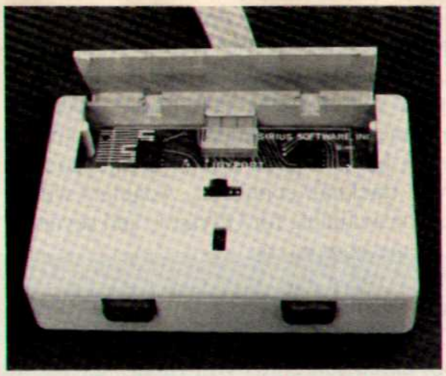
Besides extending the game I/O socket, the Joyport also allows the Apple to recognize input from Atari-type joysticks. Two switches on top of the Joyport allow you to select which device (or devices) plugged into the Joyport will be active. One switch allows you to choose between activating the two Atari ports (front) and the two Apple ports (back). A second switch allows you to choose whether the left, right, or both ports are activated.

Before going any further let's set the record straight about some of the things that the Joyport cannot do. Most important, existing programs that use Apple game paddles will not work automatically with Atari joysticks once the Joyport is installed.

Games that use game paddles will be completely compatible with the Joyport when you use game paddles plugged into the Joyport. If you want to use Atari joysticks you must either modify your games yourself, or buy software written expressly for use with the Joyport and Atari joysticks.

Why hasn't someone come out with an adapter for the Atari joystick before now? Simple: the Atari joystick works on a completely different principle than Apple game paddles or joysticks. The Atari joystick consists of five switches, that's all. No potentiometer, just five switches. One of these switches is for the fire button, the other four represent the four cardinal points of the compass. If you push the joystick left, the "west" button will be depressed internally. If you push the joystick down and to the right, both the "south" and "east" buttons will be depressed. Diagonal movement is detected when two buttons are depressed simultaneously (e.g. up and left equals northwest).

In order to obtain values for all five switches, the Joyport must be accessed twice. The first time, annunciator 1 is "off", (accessing location $C05A will turn if off) and the Joyport returns values for the fire, "east" and "west" buttons in the locations for pushbuttons 0, 1, and 2 respectively. Accessing location $C05B (turning annunciator 1 "on") will signal the Joyport to return values for the fire, "north," and "south" buttons in the same three locations.



Thus, to obtain values for all five buttons, first look at locations $C061-$C063 with annunciator 1 "off" to read values for the fire, "east" and "west" buttons. Then access locations $C062 and $C063 again with annunciator 1 "on" to get values for the "north" and "south" buttons.

As you can see, the Atari joysticks will behave much differently from Apple game paddles. They have absolutely no effect on the game controller locations ($C064-$C067) that are used to interpret the current paddle position. It is for this reason that existing software will not automatically run using Atari joysticks instead of Apple paddles.

Despite the incompatibility, the Atari joystick provides another distinct advantage: input can be obtained much more rapidly. This is because of the way the Apple paddle works. To read the paddle, the timing circuit is reset and all game controller locations are set high (they contain values greater than 127). The time it takes for each location to drop below 128 is proportional to the setting of the game paddle. Button inputs can be read with virtually no time delay.

Another difference is that the Apple paddle pushbutton locations will contain a value greater than 127 if the button is being pressed. The Atari joystick buttons cause just the opposite to take place: a value less than or equal to 127 signifies the button has just been pressed. This is a function of the Joyport. It ensures compatibility with the shift-key to pushbutton input two (pin 4) modification many users have made.

How does the Joyport work when the back switch is set to "both"? This position indicates pushbutton input should be accepted from both devices on the active side of the Joyport.

With the back switch set to "both," paddles 0 and 1 are obtained from the left side of the Joyport and paddles 2 and 3 are obtained from the right side. Turning annunciator 0 "off" (accessing location-$C058) will allow pushbutton inputs on the left side to be read normally. Switching it "on" (referencing location $C059) allows pushbuttons on the right to be read.

The Atari inputs are obtained a little differently. A second annunciator (number 0) must be "on" when input is to be read from the left side and "off" when input is to be read from the right side.

### *Atari Mode Function Selection*

| Controller Select Switch Setting | Annunciator #1 | Button 0 $C061 −16287 | Button 1 $C062 −16286 | Button 2 $C063 −16285 |
|---|---|---|---|---|
| Left | On | Fire-1 | Up-1 | Down-1 |
| | Off | Fire-1 | Left-1 | Right-1 |
| Right | On | Fire-2 | Up-2 | Down-2 |
| | Off | Fire-2 | Left-2 | Right-2 |

### *Controller Select In Middle*

| Annunciator #0 | Annunciator #1 | Button 0 $C061 −16287 | Button 1 $C062 −16286 | Button 2 $C063 −16285 |
|---|---|---|---|---|
| On | On | Fire-1 | Up-1 | Down-1 |
| | Off | Fire-1 | Left-1 | Right-1 |
| Off | On | Fire-2 | Up-2 | Down-2 |
| | Off | Fire-2 | Left-2 | Right-2 |

*Atari mode function selection. With the annunciators and the controller select switch of the Joyport set as shown, locations $C061-$C063 will indicate a movement in the specified direction.*

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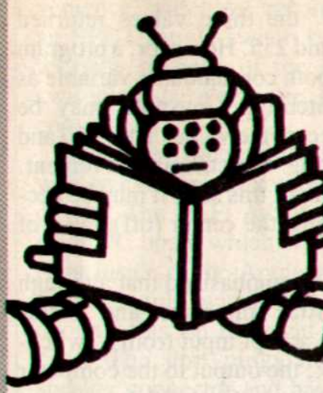

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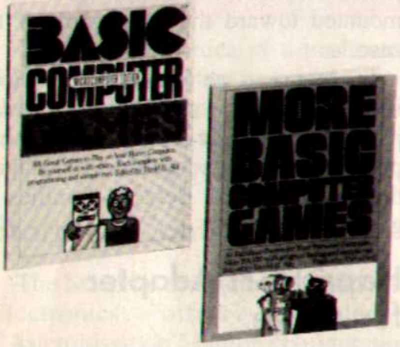

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The table shows all the combinations of this switch.

**Software Compatibility**

As you can see, a program must be written specifically to take advantage of the Joyport, or it must be modified to do so. I have succeeded in modifying a few of my shoot-'em-up games to accept input from the Atari joystick, and am quite pleased with the results.

Listing 1 shows the steps necessary to convert Creative Computing's *Super Invader*. You may wish to check the starting address of your version by typing: PRINT PEEK(-21902) + 256 * PEEK (-21901) after you have BLOADed the program. If the result is 512, you can follow the steps as shown in the table. If the address is 768, save the modified version by typing BSAVE INVADERS (JOYPORT),A768,L24100.

Sirius is currently marketing several games that may be played with an Atari joystick connected to the Joyport. These include *Gorgon, Copts and Robbers, Outpost, Hadron, Snake Byte, Twerps and Borg*. Gebelli's *Horizon V* may also be played with an Atari joystick by typing control-shift-p at the beginning of the game. Sirius has sent free Joyports to some of the major game publishers, including On-Line and Broderbund, in order to encourage development of compatible software.

```
]BLOAD INVADER.MACH

]CALL -151

*168E:90

*16D5:90

*12FF:20 01 60 10 04 A0 AA EA EA

*6001:AD 5A C0 AD 62 C0 10 0A

*:AD 63 C0 10 08 A4 1A A9

*:7F 60 A9 00 60 A9 FF 60

*3D0G

]HOME

]BSAVE INVADER.MACH (JOYPORT),A512,L24100
```

**Listing 1. Patch that will let you play Creative Computing's *Super Invader* with an Atari joystick using Sirius Joyport.**

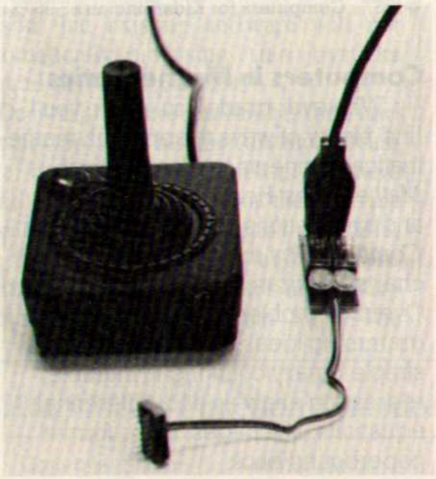
The Joyport has a suggested retail price of $74.95 and includes a copy of *Computer Foosball* (1-4 players).

It should be emphasized that although the Sirius Joyport and Astar Octa Stick both accept input from a switch-type (Atari) joystick, they are not interchangeable (See Octa Stick review below).

## Astar Octa Stick II

The Octa Stick II is an interface for using an Atari-type joystick with an Apple. As mentioned above, this type of joystick is either completely on or off in a direction and, if pushed diagonally, can activate two switches.

The heart of the mechanism is a small interface consisting of a 16-pin DIP plug, a male receptacle for a DB-9 Atari joystick plug, some resistors and relays and two trim potentiometers.



Since this type of joystick returns only three values in each of two directions (center, up, down or center, left, right), the center value may have to be adjusted so it does not look to the program as though the joystick has been pressed. "Normally" the three values returned are 0, 127, and 255. However, a program written for both continuously variable as well as switch-type joysticks may be written to accept the values 100, 120 and 140 indicating directional movement. For a program of this sort, it may be necessary to adjust the center (off) value of Octa Stick.

It should be emphasized that although the Octa Stick interface and Sirius Joyport both accept input from a switch-type joystick, the output to the computer is quite different. Octa Stick puts out three resistance values which can be thought of as simulating the left, middle, and right position of a potentiometer-type joystick. Games written for the Sirius Joyport cannot be used with Octa Stick while games like *Thief* and *Snack Attack* work well with Octa Stick but not the Joyport.

The Octa Stick II interface has a sticky back permitting it to be mounted on the side of the Apple. Unfortunately, the cable is only six inches long which means that if Octa Stick is one's only interface, it must be mounted well to the back of the Apple case. However, if it is used in conjunction with an extension port it can be mounted toward the front right of the case.

In summary, we found the Octa Stick interface with a Newport or Atari joystick considerably better than potentiometer-type joysticks for playing the Pac-Man and Berzerk families of games.

## Happ Hi-Fi Adapter for Apple

We have mentioned several times on these pages that the built-in Apple speaker leaves a lot to be desired and that a great improvement in sound can be obtained by replacing the Apple speaker

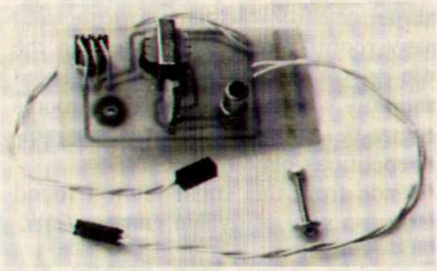
### Apple Extension and Auxiliary Game Port Devices

| Name | Manufacturer | Retail Price | Cable Length | Number and Type of Input Sockets |
|---|---|---|---|---|
| Applexpander + S | CJM | $54.95 | 18" | 2 Jones |
| Expandaport | Datamost | 69.95 | 33" | 6 DIP (3 switchable) |
| E Z Port | Versa Computing | 24.95 | 24" | 1 DIP (Zero insertion pressure) |
| Game Socket Extender | Happ Electronics | 14.95 | 24" | 1 DIP (Zero insertion pressure) |
| Joyport | Sirius | 74.95 | 24" | 2 DIP1 (2 switchable)<br>2 DE-9 (2 switchable) |
| Octa Stick II | Astar International | 22.95 | 6" | 1 DE-9 |
| Paddle Adapple | So. Calif. Research Group | 29.95 | 14" | 2 DIP (2 switchable) |
| Paradise Ports | Tech Designs | 39.95 | 18" | 4 DIP (3 switchable) |
| Select-A-Port | TG | 59.95 | 18" | 5 DIP (4 switchable) |

with an external one. For maximum convenience, we have recommended that an SPDT toggle switch be installed on the side or back of the case to make switching between the two speakers convenient.

Now Happ Electronics has come along with an even more exotic and convenient device. The Hi-Fi Adapter consists of a small PC board which is mounted on the right inside of the Apple case. The handle of a toggle switch extends through the cooling fins on the right of the Apple case. The unit plugs into the Apple speaker connector and has two outputs. One simply connects to the internal Apple speaker and, with the toggle switch down, allows for "normal" operation. With the toggle switch in the up position, the sound is routed through a small isolation transformer to the input of a hi-fi amplifier.

As anyone who has tried to connect the Apple speaker output directly to a hi-fi amplifier knows, both sides of the speaker output are above ground and connecting one side to the ground of an external amplifier creates havoc in the Apple. This havoc takes a variety of forms, the most common of which is the equivalent of constantly hitting the reset key. Needless to say, this is highly undesirable. The Happ Hi-Fi Adapter cures this problem and makes it possible to run the speaker output through a hi-fi system.



Since the Apple puts out only one channel of output, we recommend for amplifiers without a monaural switch that a Y connector be used to split the signal into two channels. Short connector cables (one RCA female input, two RCA male output jacks) are available from Radio Shack and other electronic supply houses for about $2.00.

If you have not used an external speaker (or amplifier), we can confidently predict that you will be astonished at the results.

The Happ Adapter comes with a short program called Apple Bagpipes. After typing it in, you will be able to achieve a wide variety of different sounds by simply typing one key from the keyboard. Although the instructions do not state this, in order to try out different sounds, you must press reset and run the program again for each different sound. This program gives only a small sampling of the possible sounds available from the Apple. *Electric Duet* from InSoft and games such as *Juggler* or *Tumble Bugs* demonstrate a much wider range of possibilities.

The documentation included with the Hi-Fi Adapter was excellent, particularly the photographs which showed exactly how it was to be installed.

We found the device substantially enhanced the fun of playing games on the Apple and was well worth $25.

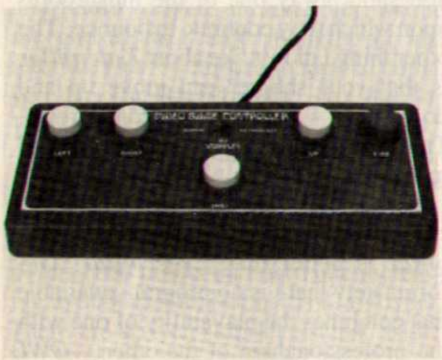
## BUTTON CONTROLLERS FOR ATARI AND VIC

If you like the idea of a pushbutton controller, but lack the time, talent, or inclination to construct one, you may want to purchase one of the ready-made controllers described below.

### Starplex Controller

The Starplex controller from Starplex Electronics, offers an authentic "Asteroids-style" button configuration, as well as the fastest set of pushbuttons I have ever seen. In addition, an optional AA battery powers a "rapid-fire" mode, automatically repeating fire faster than you can do it by hand.

Because the pushbutton array is large and has a light touch, the controller takes a bit of getting used to. Eventually, however, I found that the lightning fast direction changes possible with Starplex resulted in higher scores.



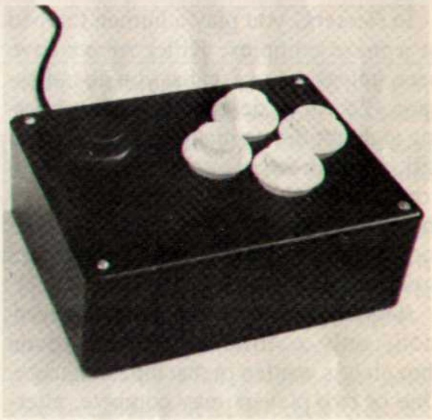
It should be mentioned that because many games do not allow a new shot to be fired until an old one leaves the screen, the "rapid-fire" option will not always work optimally. Still, you can fire continuously merely by holding the button down, rather than having to repress the trigger for each shot (or battery of shots). Over the long haul this reduces fatigue, and the incidence of "joystick elbow."

The unit lists for $29.95, which is a bargain for the most authentic game of Asteroids this side of the coin-op It improved my score on several other games as well.

### KY Enterprises

The controller offered by KY Enterprises uses a directional-style configuration, less suitable for Asteroids but more versatile overall. For those unfamiliar with the arcade configuration, it is much easier to master this logical layout.

The unit exhibits extra sturdy construction—as if its makers knew it would have to withstand a few bounces off the floor. It is very large, and can be cradled or used on a tabletop by even the tiniest kids. The buttons themselves sit in raised collars, and, though not as fast as the buttons or the Starplex unit, appear to be the "regulation" coin-op standard. They are large and easy to control.



The KY Enterprises controller is priced at $19.95, and is available in left- or right-handed models. They also manufacture controllers for the handicapped.

### Accu-Play

A third pushbutton controller, the Accu-Play Control Board, we did not have an opportunity to test. It sells for $29.95 from Accu-Tech Products. ■

# TRS-80 Color Computer Games

**By Owen W. Linzmayer and David H. Ahl**

## Berserk

In the arcades, Stern's Berzerk game has a large following. When Atari released their home VCS version of Berzerk back in August, the demand for the game almost cleared the shelves. Not surprisingly, Color Computer owners also want to enjoy the thrill of Berzerk—luckily, there is *Berserk* from Mark Data Products.

In *Berserk,* you play a human trapped in a maze complex. Killer robots have been unleashed to see that you do not escape. You must destroy robots by shooting at them, but no matter how many you kill, you can never escape. Coming into contact with either the electrified walls or the robots is deadly. If you wait in a room too long, a smiling Evil Orville chases you out or kills you.

*Berserk* plays just like the arcade version, only a little bit slower—even though it is written in machine language. One or two players may compete, alternating turns. You use the joystick to move your man through the maze. If you press the fire button, you stop and shoot in the direction that you were moving.

There is no on-screen scoring, nor any indication as to the number of men remaining. When you lose a man, the computer switches to a lo-res screen that shows you this information.

The colorful hi-res graphics of *Berserk* surpass even those of the original arcade game. The movement of the player is very smooth; it actually looks like a real human running. The animation of the robots is equally impressive.

*Berserk* has nice sound effects that enhance game play. One thing I have found that detracts from the game is the fact that many rooms repeat themselves. In the coin-op version, each room is created randomly whereas in Berserk the rooms seem to be in memory. This leads to rather repetitious playing.

Aside from this small fault, I found *Berserk* a very enjoyable game.—*OWL*

## Caterpillar

Atari struck it rich last year when they introduced the coin-op video game Centipede. It was, for the most part, a high-speed shoot 'em up with cute graphics that appealed to men and women alike. Not surprisingly, the arcade Centipede was soon followed by home computer versions. *Caterpillar,* from Aardvark Software is one of the best adaptations of the original arcade game.

*Caterpillar* is a fast paced game written in machine language. It supports only one player using the right joystick. In the game, you have three shooters with which you must destroy an onslaught of attacking insects.

Your base is situated at the bottom of a mushroom patch. A large caterpillar starts off at the top of the patch. Each time a segment runs into a mushroom, it drops down a level and reverses direction. Shooting a caterpillar segment turns it into a mushroom and causes the creature to split in two.

In addition to the caterpillars; spiders, fleas, and scorpions also infest the mushroom patch. If your shooter collides with any insect, it is destroyed.

*Caterpillar* plays very much like Centipede, with a few exceptions. Your shooter is over-responsive to the joystick controls. Simply pressing the joystick to the left causes your shooter to jump almost instantaneously all the way to the left side of the screen. Scoring in *Caterpillar* is almost identical to that in Centipede.

The graphics in *Caterpillar* are hi-res, although they really don't look it. There are many colors and shapes, but unfortunately they appear very blocky. The screen colors don't change after every wave of insects as they do in Centipede, but that doesn't affect game play. The movement of the caterpillar and other insects is very smooth; there is no flicker at all.

*Caterpillar* produces sound effects only when something is destroyed. Since it has been determined that almost 50% of the appeal of an arcade game is the audio effects, *Caterpillar* falls sort in this area. Although it lacks enticing sound effects, the game does offer a great challenge. It is very difficult to score over 20,000 points, and almost impossible to master the game.

I recommend *Caterpillar* to anyone who is more interested in game play than exciting graphics and sound effects.—*OWL*

## Katerpillar

Wait a minute, didn't I just review this? Yes, and no. *Katerpillar* is pronounced the same as *Caterpillar* and they are both TRS-80 Color Computer adaptations of Centipede. The difference between the two programs is easy to explain. *Caterpillar* plays much more like the arcade game, and *Katerpillar* offers nicer graphics and more pleasing sound effects.

Since *Katerpillar* is modeled after Centipede, its description is similar to that of Caterpillar. Rather than rehash the basic information, let's discuss the program itself. After EXECuting *Katerpillar,* you are presented with a very professional banner page. After the program displays the scoring table, you play the game.

I can find only two faults with *Katerpillar*. Sometimes the centipedes don't drop down as they are supposed to; they get caught in an endless loop until you shoot away one of the mushrooms upon which they continue to bounce. The other thing I didn't like about *Katerpillar* is that your shooter can move up and down only within two horizontal rows. This severely limits your movement and makes the game for two difficult.

If you enjoy Centipede, but like pretty colors and flashy programming, *Katerpillar* is better than *Caterpillar*. Unfortunately there is no program available that combines the playability of one with the professionalism of the other.—*OWL*

| Game | Memory | Price | Manufacturer |
|---|---|---|---|
| Berserk | 16K | $24.95 | Mark Data Products |
| Caterpillar | 16K | 19.95 | Aardvark Software |
| Ghost Gobbler | 16K | 21.95 | Spectral Associates |
| Katerpillar | 16K | 24.95 | Tom Mix Software |

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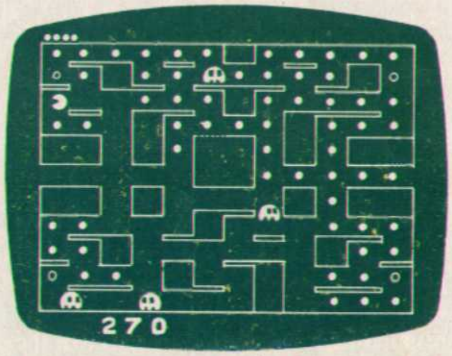
## Ghost Gobbler

Surprise! Surprise! Another version of Pac-Man. No attempt has been made to disguise the fact that *Ghost Gobbler* is an imitation of Pac-Man. The instructions tell us that "you must gobble all of the food dots while avoiding the ghosts. There are four 'energizer' dots which will make the ghosts turn blue and become scared. The ghosts remain scared for a variable period of time (depending on which board you are currently on) and, then they will blink for two seconds and return to their normal color. While the ghosts are scared, blinking or just after they have returned to normal color, you may eat them for 200, 400, 800, or 1600 points respectively."

Bonus shapes (plum, cherries, mushroom, happy face, etc.) appear just below the center prison twice during each board. These shapes are worth bonus points (100 points on board one increasing to 5000 points on boards 17 or over). There are sixteen skill levels and, as the skill level increases, several things happen: your gobbler slows down, the ghosts follow the gobbler more closely, and the scared ghosts run away more cleverly.

At the center bottom of the field is a teleportation spot which immediately transports your gobbler to the upper center of the screen. The ghosts cannot follow you through the teleporter which works only one way. Several players found this very confusing during play of the game because, having cleared the top of the screen they were attempting to clear the bottom and did not wish to be teleported away from the area they were clearing.



You start with five gobblers and the number remaining is displayed in the upper left corner of the screen. Five additional gobblers may be awarded during the play of the game for each 10,000 points accumulated.

In summary, the game is a good imitation of Pac-Man. It, like the other TRS-80 Color Computer Games, suffers from the horrible imprecision of the Color Computer joystick. Nevertheless, if you enjoy Pac-Man, chances are you'll like *Ghost Gobbler* too.—*DHA*

### Manufacturers

**Aardvark Software**
2352 S. Commerce
Walled Lake, MI 48088

**Mark Data Products**
23802 Barquilla
Mission Viejo, CA 92691

**Spectral Associates**
141 Harvard Ave.
Tacoma, WA 98466

**Tom Mix Software**
3424 College N.E.
Grand Rapids, MI 49505

# BLISTERS AND FRUSTRATION

## Joysticks, Paddles, Buttons and Game Port Extenders for Apple, Atari and VIC.

By David H. Ahl

Do you find yourself putting off a game of *Super Invaders* or *Sneakers* because of the too-small button on the Apple Paddle controller? Did you buy *ABM* or *Red Alert*, only to find them too frustrating to play without a joystick? Do you find *Snack Attack* or *Jaw Breaker* impossible to play from the keyboard?

Increasingly, with the sophisticated game designs appearing on the market and with more and more designers copying the popular arcade games, it is next to impossible to enjoy these games without a good set of paddles and joystick controls.

In this review, we examine many of the popular paddle and joystick controls now available for the Apple, Atari and VIC computers. We also look at some ancillary accessories which make these controls easier to use.

### Paddle Controls

The word paddle is a misnomer. The rotary control called a paddle is actually a variable resistor, which is also (correctly) known as a potentiometer or rheostat. In a sense, the control is the same as a volume control in a radio except that the resistance varies in a linear fashion from the beginning to the end of rotation in a computer control whereas it follows an "S" curve in most audio devices.

The reason this control is called a "paddle" in the personal computer industry is that it originally got its name from the control which moved the paddles on the screen in the game of Pong. This was followed by the game of Breakout and by then the incorrect term, paddle, had taken hold.

In a book that I am working on, an editor changed the word paddle to "knob." This, of course, is equally incorrect. However, since it is unlikely that the computer world is going to grow to love the correct term potentiometer or rheostat, we are stuck with paddle.

Incidentally, it is up to the computer program to translate the resistance value from the paddle into something that can be used in the program. In the Apple, normally one end of the resistance is assigned the value of 0 and the other end 255. However, game designers can achieve much tighter control, i.e., less paddle rotation, by using the value of say 60 as one edge of the screen and 180 as the other.

Good software must also take into account one other factor: paddle and joystick adjustment. Since there seems to be little standardization among manufacturers as to the value of the potentiometer to be used in paddles and joysticks, good software should allow the user to set the joystick or paddle to one extreme and then the other and adjust the program accordingly. Of course, another acceptable approach is to use just a portion of the rotation. The resistance of the potentiometers in the paddles and joysticks we have measured has varied from a low of 70K ohms to a high of 185K ohms. The nominal value "expected" by the Apple computer, incidentally, is 150K.

Controls with higher resistance require less rotation from one side of the screen to the other, thus the control responds more quickly. On the other hand, high-resistance controls are less precise for making fine adjustments needed to hit small targets such as the bonus pine trees in *County Fair*.

### Joystick Controls

Joysticks come in two varieties. First is the type found in most coin-op arcade games, the Atari Video Computer System and the like. It has four switches corresponding to the four directions that the joystick may be pushed. Hence, when the joystick is in the center position, all switches are off. If it is pushed squarely to the north, east, south or west, one switch will go on for each direction. An intermediate (diagonal) direction will normally cause two of the switches to close.

In the joysticks used in arcade games, the diagonal directions are sometimes "locked out" by means of nylon adapter plates which permit movement in only four (sometimes only two) directions.

A second type of joystick is one which uses two potentiometers, one for the north/south or Y direction and the other for the east/west or X direction. This type of joystick often does not have automatic centering as the four-switch joysticks usually do. Centering on the ones that have it is usually accomplished by means of small springs which may be removed if the user desires.

In general, a potentiometer-type joystick may be used for all joystick applications whereas a switch-type is useful only for games requiring on-off movement control in two, four or eight directions. However, it is generally easier to use a switch-type joystick for the Pac-Man and Berzerk families of games as it provides more positive control and better centering.

### User Features

The motoring magazines sometimes say of a car, "the controls fell naturally to hand." We found that some of these controls felt better in the hand than others. Indeed, some were clearly designed for table top use and did not fall at all naturally to hand. Furthermore, hand sizes

are different, so what may be a good hand-held control for an adult male may be overly large for women and children.

Tactile feedback is the positive indication to the user that contact has been made in a control. Two schools of thought exist about tactile feedback both among users and manufacturers. One holds that it is necessary and good. The other holds that it is unnecessary and not cost-justified. I know people who want a positive click when a firing button is pressed whereas I press buttons forcefully enough that I don't need or want any additional feedback to tell me that I've made contact. Since it is a matter of personal preference, we have simply noted in this chart whether a control has tactile feedback or not.

### Game Control Extenders

Ordinary DIP (dual in-line package) sockets are not designed to be used over and over; eventually they won't make contact. Also, repeatedly stressing a 16-pin connector will cause the pins to bend and possibly snap off. Furthermore, continually messing around with the game I/O connector on the back of the Apple motherboard is just not healthy for the motherboard itself.

Hence, if you expect to change back and forth between joysticks and paddles very much, we strongly recommend a game control extender. One type consists of a quick disconnect zero insertion pressure I/O port mounted on the outside of the computer. The device is permanently plugged into the Apple game port inside. Examples of such devices are the EZ Port from Versa Computing or game socket extender from Happ Electronics. Utilizing a ZIP (zero insertion pressure) socket, the user merely plugs in his 16-pin DIP plug and throws a small switch which engages the connection within the socket.

An alternative to a single port extender is a switchable port unit. While more expensive than single extensions, these units allow paddles, joystick, lightpen, VersaWriter or other control devices to remain plugged into the Apple permanently.

We've found it useful to paint the notched end of the DIP connector of various plug-in devices with a small dab of white paint or liquid paper. This marked end corresponds to Pins 1 and 16 which are the up direction on most extension port devices when they are mounted on the right side of the Apple case.

### Protect the Connector

We also keep small pieces of styrene around to plug the DIP connectors into when the device is not in use. All too often pins have been broken or bent when a socket was accidentally stepped on or banged by a chair. The white styrene (a packing peanut will do quite nicely) not only protects the plug but is also quite visible if it falls on the floor.

Atari joysticks use an Atari-type DB-9 plug (which is considerably more rugged than a DIP connector. Nevertheless, repeated insertion and removal tend to dis-

ILLUSTRATION BY JAMES C. HEGEDUS

tort the female receptacles on the joystick cables.

To overcome the connector vulnerability problem, CJM has gone to rugged but more expensive Cinch Jones connectors (see description below).

### Test Procedure

Each paddle and joystick was given a thorough workout by all members of our game testing panel. As we've mentioned before, our panel consists of adults and children of both sexes over a wide age range. Thus, products are judged from many different perspectives.

Paddles were tested using the following games: *Torax, Tsunami, Sneakers* and *County Fair*.

Potentiometer-type joysticks were tested using *Photar, ABM, Pegasus II, Red Alert* and *Twerps*.

Switch-type joysticks were tested with *Thief, Snack Attack* and *Labyrinth* on the Apple, *Preppie* and *Star Raiders* on the Atari Personal Computer, and *Dodge 'Em, Pitfall* and *Cosmic Swarm* on the Atari VCS.

### Recommendations – Apple

For maximum game playing enjoyment, we recommend the following for the Apple computer.

1) *A set of paddles.* Paddles differed mainly in firing button placement, size, shape, and throw. You should look for one that suits your style of play. In general, left-handed players will find fewer suitable paddles than right-handed players.

2) *A potentiometer-type joystick.* As with paddles, the main differences among joysticks were in the firing buttons, although, as the individual descriptions indicate, there are other differences as well. We recommend a joystick which is not self-centering or one in which the self-centering can be defeated—preferably outside the case. While trim adjustments are desirable, most joysticks did not have this feature, and those that did were not necessarily the best in other regards. If you do not have or plan to get a switch-type joystick (see number 3), then you should probably get a potentiometer-type joystick with self-centering.

3) *Switch-type joystick.* The value of this type of joystick for playing Pac-Man, Berzerk and maze games cannot be overstated. It is far superior to a potentiometer-type joystick and you will be astonished at the added enjoyment of playing games using this type of joystick. To use a switch-type joystick with the Apple computer, you will need an adapter of which there are only two on the market—from Astar and Sirius. Naturally, you must have this type of joystick for the Atari Personal Computer and Video Computer System.

4) *Game port extender.* It is a matter of personal preference whether to get a single game port extender with a zero insertion pressure socket or a more elaborate unit with up to six sockets for external devices. While all the extension devices tested had one or more desirable features, no one device had absolutely everything. Our ideal device would be one with four switch selectable, zero insertion pressure DIP sockets, two non-diode isolated sockets, and two switch selectable DB-9 sockets. The device would also have a jumper panel so that one or two of the DIP sockets could be wired to your own specifications.

5) *An external speaker or hi-fi adapter* (see reviews for explanation).

By selecting the cheapest device in each category, a set of these five devices could be put together for as little as $100. However, a more realistic budget would be $180-200. That may sound like a lot, however, the increased enjoyment from playing games with quality controllers and good sound cannot be overemphasized.

### Recommendations – Atari and VIC

For an Atari computer or VCS (or Commodore VIC 20) our recommended list is a bit shorter than for the Apple.

1) *Switch-Type Joystick.* Of course you have the joysticks that came with your system, but we think an arcade style stick will substantially enhance your game play.

2) *Console-Type Controller.* For games such as Asteroids or other adaptations of arcade games with button controls, you might want a controller that plays the same as the original. Several models are available with different key arrangements, rapid fire buttons, etc.

3) *Game Port Switch.* Several companies have announced devices which select any one of two or three devices plugged in and route the signal from that one to the Atari. None were available for us to test, but they seem like a good idea.

One of each of the above will set you back about $80. We think it is well worth it for the added enjoyment of game play.

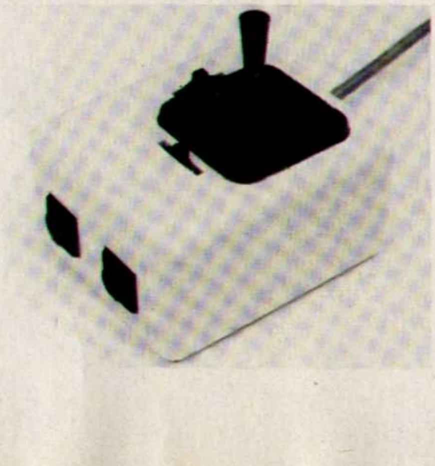
Have Fun!

# POTENTIOMETER-TYPE JOYSTICKS FOR APPLE

## A2D Joystick (2001)

In contrast to other joysticks, the A2D Model 2001 features an open gimbal design usually found only in precision radio controlled model airplane controls. According to the brochure, "this design results in a lighter feel and more precise movement than that available with ball stick assemblies." We found this to be true and, in fact, found that this design allowed us to play games for which we normally recommended a switch-type joystick (Pac-Man, Berzerk, etc.).

The compact size of the Model 2001 permits it to be easily held in one's hand, and the placement of the two buttons on the back allows them to be pressed with the index and middle finger of the hand holding the joystick. Unlike some others (and the earlier A2D Model 1002), the Model 2001 does not favor either left or right handed players. We especially liked the buttons on this joystick. They are large (5/8" square), have a very short throw, and provide excellent tactile and aural feedback.



Mechanical trim is provided for each axis, allowing accurate self-centering of the stick.

The control knob on the joystick is relatively small and is held by friction to the end of a non-threaded shaft. People had mixed feelings about this. Some liked the small size because of the precision "feel" it seemed to impart. Others, however, found the knob occasionally came off in their fingers during particularly violent play of a game. Once aware of this, most players were able to adjust their playing style to compensate.

The Model 2001 comes with an extremely generous 8½' shielded cable. As it is round and not a ribbon connector, it is quite flexible.

In summary, the A2D Model 2001 is an outstanding joystick in practically every respect and it got high marks from all members of our playing panel. Our only minor criticism is the friction-fit knob, but most people will not find this a major drawback.

## Kraft Joystick

The Kraft Joystick is mounted in the same large 4″ x 4″ x 2¼″ housing as the Kraft Paddles. It is slanted forward by about 10 degrees and has two firing buttons in the upper left corner, one on the top and one on the back. Their positioning makes it convenient to fire with the thumb and the index finger or index finger and middle finger of the left hand. Like many of the other joysticks tested, the Kraft Joystick favors the right-handed player.

The joystick knob itself is ⅜″ in diameter. There seem to be two schools of thought about knob size. One holds that knobs ought to be relatively large, similar to those found on coin-op arcade games, while the other holds that the joystick is a precision instrument and the knob ought to be small, like those found on model airplane RC controls.

Our game playing panel members had no strong preferences as to knob size. We did prefer that the knob not come off in one's hand during violent game play. Fortunately, the Kraft knob is well designed in this regard. It is permanently fixed to the staff and, although the staff itself unscrews from the controller ball, it did not unscrew during game play nor did it develop any annoying looseness as did several other joysticks.

Two levers on the housing (located below and to the left of the control stick) allow fine adjustments to the electrical center of the joystick. Each lever controls a separate axis (X or Y). As we mentioned before, we found this a most desirable feature, not only for game playing adjustments, but especially when using a joystick as a graphics input device.

We have also been heard to say how nice it would be to find a joystick on which self-centering could be turned on or off at will. Lo' and behold, the Kraft Joystick has such a feature.

To disengage the spring centering mode, the joystick is simply turned upside down and two little mechanical switches are moved to the "free" position. To reengage the automatic spring centering, the switches are moved away from the free position—that is all there is to it!

Incidentally, the first joystick we got from Kraft had one of these two switches installed upside down, so we could move only the X axis to the free position. After taking the joystick apart completely, we determined that these switches were permanently glued in place and could not be fixed by the user. We notified the factory and got a new joystick promptly.

We were assured by several people at Kraft that this had never happened before, nevertheless, it might not be a bad idea to look over the joystick at your dealer and make sure it is completely functional before taking it home.

The Kraft Joystick has a generous 5′ cord which is more flexible than most. Like the paddles, it has a curious little 6″ wire with an alligator clip on one end attached to the DIP plug. This clip should be connected to a chassis bolt to ground the cable shield, a fact which is not mentioned in the instructions.

All in all, our game playing panelists were very enthusiastic about the Kraft Joystick. Although the pushbuttons provide no tactile or aural feedback, this lack is more than compensated for by the excellent features of the joystick: a tight knob, external trim adjustments and selectable operating mode (self-centering or free). The joystick is best suited for operation on a table top or in one's lap; there is no convenient way to hold it comfortably in one hand and operate the pushbuttons as well as the stick. Bottom line: highly recommended.

## TG Super Joystick

The housing of the TG Super Joystick was the largest one tested. Its larger size coupled with the placement of the firing buttons on the left top of the case make it most suitable for table top operation. Some right handed players found it could be held in the left hand for games using only one firing button.

The firing buttons are large (0.6 in dia.) and flat; thus they are easy on the fingers. They do not provide any tactile feedback and must be pressed all the way down to make contact.

The joystick itself is self-centering, a handy feature for playing *Twerps*, *Borg* and other games in which it is necessary to remain stationary on the screen. Self-centering may be defeated by removing the bottom of the case (four screws) and, with a needle nose pliers, removing four small springs from the joystick mechanism. This is a mixed blessing. While it is handy to be able to defeat self-centering, it is not something you want to do frequently. After two back-and-forth changes, we decided to leave self-centering in effect permanently.

On the other hand, the trim adjustment controls are on the top of the case and are easy to adjust when necessary.

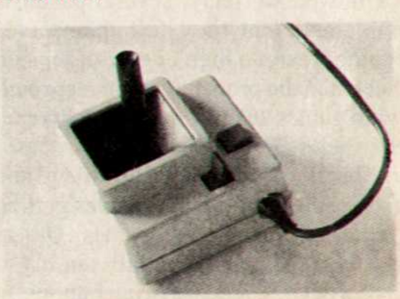
The joystick knob is on the small side and is held by friction to a non-threaded shaft. As a result, it occasionally came off during exuberant game play. However, as with the A2D stick, most players were able to adjust their playing style to compensate.

In summary, for a right-handed player the TG Super Joystick is a good quality product with some minor drawbacks that did not substantially detract from its overall performance.

## Joystick II

Joystick II is a compact (3½″ sq.) joystick for either table top or hand-held use. Because of the firing button placement at the left top of the unit, it tends to favor right handed players.

The joystick handle is small in diameter (⅜″), but its length makes it comfortable to use.



The firing button for direction 0 is ½" square and provides both tactile and aural feedback. Unfortunately, the switch for direction 1 is just that, a switch. To the left, it is on (like a light switch) while to the right it provides momentary contact with spring return. We found this arrangement was not suitable for playing games such as *ABM* and *Pegasus II* which require the use of both firing buttons.

The first unit we received provided variable resistance in direction 0 of 30K to 130K ohms (values of 50 to 255 to the Apple) and thus could not get to the right boundary in most games. We removed two rubber feet, opened the case, and were able to adjust the shaft position on one pot to correct the problem. Another unit tested in a local computer store did not have this problem.

Installation of Joystick II is the best we have seen. A rubber strain relief 6" from the DIP plug end of the cable fits in the notch at the back of the Apple. A U-shaped ground clip connected to the cable shield fits over the notch thus minimizing RF interference.

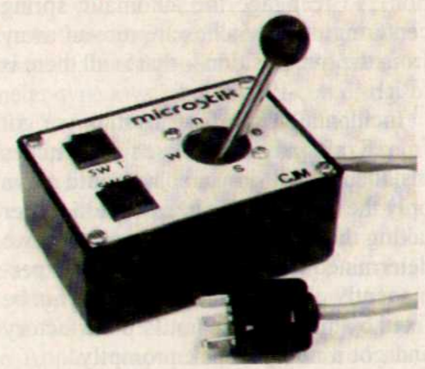
The instruction booklet is excellent and provides a test program. Were it not for the strange switch instead of a more desirable firing button, we would have given Joystick II our highest rating.

## CJM Microstik

Of all the joysticks tested, the CJM Microstik had by far the easiest movement. In other words, the resistance to moving it in a given direction was virtually nil. Also, because of its larger ball (nearly ¾" in diameter) and longer handle, it left all of the users with the impression that it was extremely easy to move and adjust. Indeed, it was one of the few joysticks that could be substituted for a paddle in games which required precise adjustment *(County Fair, Tsunami,* etc.). It was also suitable for use with games for which we normally recommend a switch-type joystick such as *Thief* and *Snack Attack.*

On the other hand, because the joystick moved so freely, several panelists complained that they felt themselves gripping it with a high degree of tension to keep it in the proper position, especially with games such as *Torax* and *Photar*. Nevertheless, the tension, in some cases contributes to accurate adjustment and some panelists found themselves getting excellent scores in these games. Others just found themselves unduly tense.

The pair of ½" square firing buttons on the left top of the joystick assembly strongly favored right handed players, i.e., those who wanted to control the joystick with their right hand and fire with their left. On games which required both firing buttons to be pressed, the joystick was most suited for tabletop use, whereas on games with only one firing button required, handheld control was possible with the left thumb controlling the firing button. The buttons are very short throw and provide aural, but not tactile feedback.



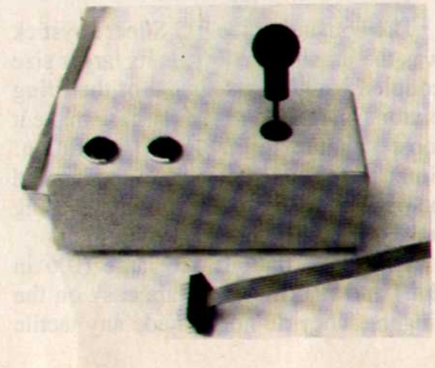
The cable is fairly short (3' 4") and terminates in a six-pin Jones plug which must be used in conjunction with a CJM Applexpander. Since this is designed to be mounted on the right outside of the Apple computer housing, the short cable length is not a disadvantage.

In summary, the CJM Microstik is of excellent quality throughout. Its exceptionally easy movement coupled with the long throw may well make this the joystick of choice for you.

## Datamost Joystick

A metal case coupled with a ¾" diameter joystick ball contribute to the solid feel of the Datamost Joystick. Two pushbuttons are mounted on the top left of the case toward the rear; unfortunately, they are somewhat small—just over ¼" in diameter.

While the small size of the housing lends itself to holding in one's hand, we found that only one button could conveniently be pushed at one time. Thus, handheld use of this control was not suitable for games such as *Pegasus* and *ABM* which require both buttons to be used. For games such as this it was necessary to put the case down on a flat surface and control the buttons with the opposite hand (usually left) from the one controlling the joystick movement. One of our panel members who preferred lefthand control of the joystick and righthanded button pushing found this control rather awkward because of the left side position of the buttons.



Although button movement was very short (about ¹⁄₁₀"), a desirable feature, some of our panelists felt that more pressure was required to press the buttons than with other joysticks. Indeed, several of our panelists complained of finger fatigue after using this unit.

The Datamost Joystick handle has extremely short play; as a result it has fast action but is difficult to adjust precisely. It is not self-centering nor does it have potentiometer adjustments. There are no instructions included with the unit.

In summary, for a righthanded player, the Datamost Joystick offers a solid feel, quick action, ¾" diameter ball and short button movement. Button pressure seemed high and button placement was awkward for lefties.

## Astar Robo Stick-1

The Robo Stick-1 is a high-quality joystick imported from Japan by Astar International. Indeed, we found it good enough to use in place of paddles for games such as *Torax* and *County Fair* which require rather precise paddle movement.

The resistance of Robo Stick is very low (75K ohms) which contributes to the feeling of precise movement. On the other hand in some games which look for the full 150K ohm resistance, Robo Stick was unable to reach the edge of the screen—a rather serious disadvantage.

The hand control is a nice chrome ball approximately ¾" in diameter. Two ⅜" diameter pushbuttons are located on each side of the rear part of the black plastic case.

The firing buttons on Robo Stick are concave, i.e., the rim of the button is higher than the center. In games requiring much firing, this can be very hard on one's fingers.

We found it most comfortable to hold the case in either the right or left hand using the thumb and middle finger to control the two buttons while the other hand attends to the control of the joystick. People with small hands may find handheld use difficult.

We found that people had relatively strong preferences as to the placement of firing buttons and joystick controls. Those who liked Robo Stick-1 did not particularly like the TG joystick and others like it. These joysticks have both buttons to the left side on the top of the control. In general this arrangement is more suitable for leaving on a flat surface while Robo Stick is more suitable for holding in one's hands.

Robo Stick-1 is not self-centering nor does it have potentiometer adjustments. We are told by the manufacturer that Robo Stick-2 will have a feature which will permit it to be either self-centering or not as the user desires.

The instructions for the Robo Stick-1 include a game program to check all of the functions. It's not a wonderful game, but it is a way of testing the joystick if you don't have any other programs which use a joystick.

In summary, were it not for the concave firing buttons and low resistance potentiometers, we would have rated Robo Stick outstanding. Because of the precision feel and good arrangement of firing buttons, we still think it is a good choice for playing most joystick games, particularly at the bargain price of $29.95.

## Video Stik

Three years ago the Video Brain computer was announced with much fanfare. It was a well-engineered unit designed to compete with the Bally Arcade, Interact Personal Computer, and others of its ilk. Unfortunately, Video Brain made a bet on the APL language, their version being APLS. Unfortunately, this was not a wise choice and Video Brain went out of business within a year.

However, they manufactured a great number of joysticks and other accessories and kept the company afloat a while longer selling these accessories. Today, Video Brain is long gone, but their joystick lives on in the form of the Video Stik now marketed by Zircon.

The joystick itself has a longer stick and a longer throw than most other units on the market. This, coupled with its low 90K ohm resistance, allows more precise control than most other joysticks. On the other hand, like the Robo Stick, with certain games it cannot reach one extremity of the screen.

Video Stik is designed for handheld use and favors the lefthanded player because of the placement of the two firing buttons on the left side of the unit. In other words, when it is held in one's right hand, the two firing buttons may be easily controlled with the index and middle finger while the joystick may be moved with the left hand.

If used with an adapter such as Paddle-Adapple or software which allows interchanging the two axes, it is possible to reverse the normal axes thus permitting the joystick to be used upside down. Then it can be held in the right hand with the buttons controlled by the middle and ring finger of the left and joystick movement controlled by the right hand. Unfortunately, this reversal of axes is not always possible, hence Video Stick is probably best suited for lefthanded operation.

The handle occasionally came unscrewed, a minor annoyance. The firing buttons on Video Stick are slightly concave (outer rim higher than the center) and thus were somewhat fatiguing in

## JOYSTICKS

| Manufacturer | Model/Name | Price | Size W x D x H | Table Top/ Hand Held | Potentiometer Resistance | Trim | Stick Size (in dia.) | Button Size (in dia.) | Button Placement | Tactile Feedback |
|---|---|---|---|---|---|---|---|---|---|---|
| **Joysticks, Potentiometer-type** | | | | | | | | | | |
| A2D | 2001 | $44.95 | 3.0x3.5x2.0 | Both | 150K ohms | Yes | 0.4 | 0.6 sq | Rear side | Yes |
| Astar International | Robo Stick-1 | 29.95 | 2.6x5.0x1.7 | Both | 75K | No | 0.75 | 0.4 | Both sides rear | No |
| BMP Enterprises | Joystick | 59.95 | 4.8x2.5x1.6 | Both | 150K | No | 0.7 | 0.4 sq | Top | Yes |
| CJM | Microstick | 59.95 | 4.0x2.8x1.6 | Table | 110K | No | 0.7 | 0.5 sq | Left top | No |
| Datamost | Joy Stick | 59.95 | 2.1x5.0x1.8 | Table | 150K | No | 0.75 | 0.3 | Left top rear | No |
| The Keyboard Company | Joystick II | 49.94 | 3.2x3.2x1.5 | Both | 150K | No | 0.4 | 0.5 sq | Left top rear | Yes |
| Kraft | Joystick | 64.95 | 4.0x4.0x2.3 | Table | 150K | Yes | 0.4 | 0.4 sq | Left top & side rear | Yes |
| Syntronics | Applestix | 34.95 | (1) | | | | | | | |
| TG Products | Super Joystick | 59.95 | 5.0x3.2x1.7 | Table | 150K | Yes | 0.4 | 0.6 | Left top | No |
| Zircon | Video Stik | 49.95 | 2.5x5.3x1.6 | Hand | 90K | No | 0.4 | 0.4 | Left side rear | No |
| **Joysticks, Switch-type** | | | | | | | | | | |
| Atari | Joystick | 13.95 | 3.5x3.8x1.5 | Both | – | – | 0.6 | 0.6 | Left top | No |
| Datasoft | Le Stick | 39.95 | 1.5 diax5.0 | Hand | – | – | n/a | 0.4 | Top | No |
| D-Zyne Video | Supr Stick | 39.95 | 5.8x3.0x2.0 | Table | – | – | 1.3 | 0.8 | Top | Yes |
| Newport | Prostick Series B | 34.95 | 3.3x4.4x2.0 | Table | – | – | 1.0 | 0.5 | Left top | Yes |
| Spectravision | Quick Shot | 13.95 | 4.0x3.5x1.3 | Both | – | – | 1.7 | 0.6 | (2) Top and Left top | No |
| Suncom | Slik Stick | 9.95 | 3.5x3.5x1.5 | Hand | – | – | 0.75 | 0.5 | Left top | No |
| Suncom | StarFighter | 16.95 | 3.5x3.5x1.5 | Hand | – | – | 0.9 | 0.5 | Left top | No |
| Zircon | Video Command | 14.95 | 1.4x2.0x5.0 | Hand | – | – | 1.8 | 1.8 | Top | No |

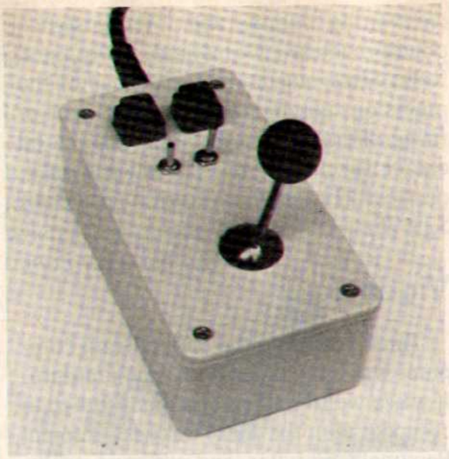
(1) Not evaluated

games requiring a great amount of firing.

Video Stik comes with a 6′ cable, two feet longer than most others. Although it has drawbacks, the long throw of the joystick coupled with the good handheld feel might make Video Stik the joystick of choice for you.

### BMP Joystick

The first thing that strikes one about the BMP joystick is the orientation of the stick and firing buttons. Rather than the common horizontal orientation with the two firing buttons on the left side, the playing orientation of the BMP stick is vertical and the two firing buttons are found toward the top end of the case. Thus the joystick is equally suitable for right- and left-handed players. As with other joysticks, it must be used in a tabletop position (or balanced on your leg) for games requiring pressing of both buttons. However, for single button games, since the BMP stick falls in the midpoint of the size range, it is suitable for either tabletop or hand held operation.



Also on top of the case are two small toggle switches, one oriented in a vertical direction and the other horizontal. These are used to reverse the direction of movement of the cursor on the screen relative to the movement of the joystick. While in most games they are unnecessary, it is a joy to have them available for games such as *Star Wars*. Some players like to play the game the way it was intended, i.e., the joystick moves the gun turret of the ship in which they are supposed to be sitting. Other players prefer that the joystick move the targets into their line of sight while leaving the ship stationary. There are other times when these switches are extremely handy, say in playing a game with paddle movement such as *Apple Brickout* which, for some perverse reason, works in the opposite direction than one might expect.

The BMP joystick itself has a rather long, stiff throw. Indeed, it was the stiffest of any of the 11 Apple joysticks that we tested. It does not have self-centering; however, because of the long throw it seems relatively easy to bring back to the center position between moves in games for which this is required.

The cable is 5½′ long and has a strain relief at the joystick end, although no strain relief or grounding clip is provided at the Apple end.

In summary, the BMP joystick has a good solid feel and provides precision control in games requiring continuous movement. It is less suitable for the Pac-Man and Berzerk family of games in which a self-centering joystick excels. The reversing toggle switches are a distinct advantage as is the placement of the firing buttons.

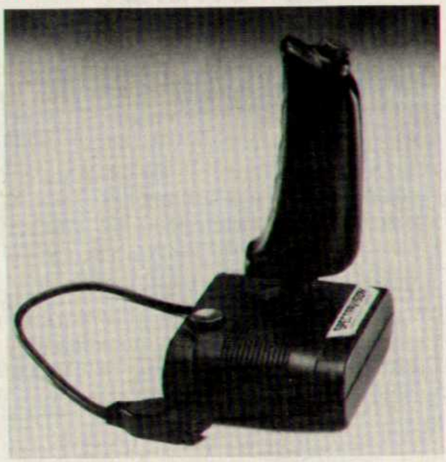
## SWITCH-TYPE JOYSTICKS FOR ATARI AND VIC

### Spectravision Quick Shot Joystick

The Quick Shot features a contour handgrip with a firing button in the top of the handle. A second firing button which duplicates the action of the one in the handle is mounted in the usual place on the top, left rear corner of the base. Although the base is just ½″ wider than the original equipment Atari joystick, because of the large handgrip Quick Shot gives the impression of being a much larger joystick.

The action of the stick is similar to the original Atari joystick, no doubt because the internal mechanism is virtually identical. However, the method of play with Quick Shot is quite different because of the handgrip. This takes some getting used to, but once players adjusted to this mode of operation, they found they liked the joystick very much, especially for games such as *Star Raiders* and *Missile Command*. For games such as *Preppie* and *Pac-Man*, some players preferred to use it like a normal joystick, i.e., gripping it at the top and using the fire button on the base.

As it comes out of the box, Quick Shot has four rubber feet. However, Spectravision also includes four non-skid, suction cup feet which can replace the four rubber pads. If you have a smooth table or other surface available, this is by far the best way to use the joystick as it permits true one-handed operation.



Quick Shot has a four-foot cord terminating in the usual DB-9 plug for use with Atari and Commodore systems.

### Atari Joystick

Probably the best known joystick in the industry, the Atari Joystick has two main virtues: it is cheap and reasonably reliable. Buoyed by the sales of millions of video computer game systems, an Atari Joystick is now found in one out of five homes in America.

The mechanism is simple. Pushing the joystick tilts the 1½″ diameter nylon base of the stick against a dimpled piece of light metal on a printed circuit board. When the stick is released, the dimpled metal pops back to its original (off) position. The firing button operates the same way. Thus, all of the contact surfaces are protected under a thin layer of mylar on a printed circuit board. On old Atari joysticks, these switch contacts were exposed, thus leading to much earlier failure than newer ones are subject to. Nevertheless, the mechanism is hardly arcade quality and is likely to need replacing sooner than most other joysticks.

With the firing button in the upper lefthand corner, the Atari joystick is clearly designed with the righthanded player in mind, i.e., the joystick is operated with the right hand and the firing button with the left. Of all of the switch-type joysticks tested, the Atari took the highest amount of force to move in a giv-

en direction. Nevertheless, with a list price of $13.95 each, frequently discounted to far less, the Atari Joystick is a good buy and seems destined to be with us for a long time to come.

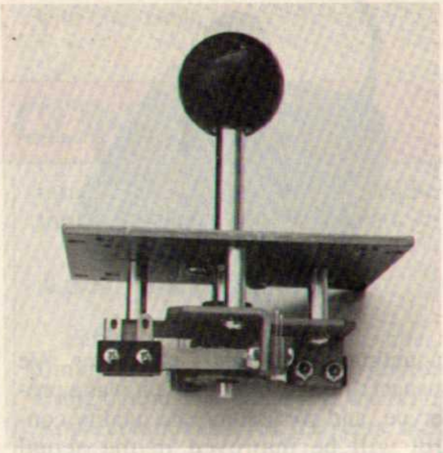
## Newport Prostick

The main business of Newport Machine Design is manufacturing joysticks for the video arcade game industry. Now, they have taken their Model 150 arcade-game joystick, mounted it in an attractive plastic case with a firing button, added a cable, and market it as a replacement for the Atari Joystick. In all respects, it is superior to anything else

currently available (with one exception—see below). The 1″ diameter ball is permanently attached to the shaft so it can't come off in your hand as others occasionally do.

The joystick uses four leaf switches which are closed when a 1″ diameter nylon "contactor" (attached to the end of the joystick) is pressed against the moveable leaf. This contactor is held in place by a spring and a "C" clip. If the user desires, this contactor may be reversed to put more pressure on the spring and thus provide higher resistance to joystick movement. We don't recommend this change, as the way the joystick is shipped provides excellent feel and positive centering.

Another good feature of the Prostick is that all parts may be replaced individually without replacing the entire unit. Thus, if the contact on one of the leaf switches becomes worn and filing with emery cloth does not restore it to reliable operation, one need replace only the one faulty switch. This is not possible with any of the other joysticks we tested.



If we have one complaint about the Newport Prostick, it would be with the firing button (the one component not manufactured by Newport). The button has a longer throw and is harder to press than the one on the original Atari joystick. As might be expected, this led to player fatigue in games such as *Onslaught* which required almost continuous button-pressing. Nevertheless, most players found that with Prostick their scores on most games could be doubled or tripled on the first play. For example, one player immediately reached the seventh screen on *Snack Attack*, whereas his previous high had been the third screen.

In summary, this is a superb joystick for the serious and even not-so-serious game player. Newport Machine Design was started eight years ago by Werner Marhold when he emigrated to California from his native Germany. Thus, it would be unfair to say that the Newport Joystick is the Cadillac of the industry, rather one should call it the Mercedes.

Since the Newport Prostick is not widely available in retail computer stores, we have listed the east and west coast distributors of the product.

For the do-it-yourselfer, Newport also markets their top-of-the-line Model 125A arcade game joystick. The Model 125A sports a large 1⅜″ diameter ball permanently attached to the shaft. Four high-quality leaf switches are held with machine screws and lock washers to a steel switch plate, which in turn, is held with four screws, lock washers and spacers to a heavy steel mounting plate. Four interchangeable nylon bushings come with the unit which permit two, four or eight way operation. As with the Model 150, the spring may be reversed on the contactor to provide more forceful operation.

The Model 125A Joystick along with a five foot long cable with DE-9 (Atari) connector on one end is available direct from Newport Machine Design, P.O. Box 418, Bishop, CA 93514, for $34.50 postpaid. Do not send to Newport for the Model 150 Prostick; only the Model 125A is available direct. Watch *Creative Computing* in an upcoming issue for an article on how to use this joystick to build your own high quality unit for the Apple, Atari, or VIC.

## D-Zyne Supr Stick

The D-Zyne Supr Stick is a massive, heavy unit—by far the largest and heaviest we tested. It is, thus, most suitable for table top operation although adults will find it suitable for hand held use as well.

Most joysticks rely on a simple set of contacts or membrane switches internally to activate each of the four directions. However, D-Zyne has opted to use more reliable microswitches in place of these contacts. I can speak with some confidence as to the reliability of microswitches. One summer my job at Grumman Aircraft was replacing the microswitches used to signal the raising and lowering of the landing gear on amphibious aircraft. These switches were on planes that had been in sea water for nearly eight years. Although the microswitches were being replaced as a safety precaution, not a single one was found faulty. The other good thing about a microswitch in a joystick is that it provides tactile feedback to the player. This means that you can both feel and hear when contact has been made in a given direction.

Externally, the D-Zyne Supr Stick has a large 1.3″ diameter ball mounted on the end of a 2″ control stick. Contact is made by moving this less than ¼″ in any direction.

D-Zyne has also chosen to use a large ¾″ diameter firing button at the top center of the case. This mounting position is equally satisfactory for right or left handed players.

The cable is a longer-than-average 5½′. This allows players to get further from the console, but the extra length gives the cat something to get tangled up in, and it is messier for storing. On balance, I like the longer cable, however.

In summary, this is a superb joystick and one which all of our playing panel members liked without reservation.

If the 5½′ cable on the D-Zyne Supr Stick is not long enough, D-Zyne Video also makes two extension cords of various lengths, one retailing for $4.95 and the other for $14.95.

## Suncom StarFighter and Slik Stick

The dimensions of these joysticks are 3½″ x 1½″—about the same size as the original equipment Atari joystick. However, because the molded plastic case is rounded on the sides and corners, it gives the impression that it is somewhat smaller than the Atari stick. It is not, but the rounded corners of the case make it much more comfortable to hold for long periods of play. Even though the Atari joystick has no sharp edges, I often find red ridges across the palm of my left hand after long games of *Star Raiders* or *Preppie*.

Both StarFighter and Slik Stick have an extremely short throw, much shorter than the nearly one inch throw in each direction of the original Atari joystick. Total throw distance in any direction is less than a quarter of an inch on these two sticks.

StarFighter
THE ULTIMATE JOYSTICK

Internally, the construction of both joysticks is identical. A brass ball is mounted on the end of the joystick shaft which is gimbled in a medium soft rubber mounting. The ball represents one contact, and as the joystick is pressed in one of the four directions (N, S, E, W), it makes contact with a small metal tab. If it is pressed to an intermediate direction (NE, etc.), it makes contact with two tabs. In theory this design should give the joystick longer life than the original equipment Atari stick. This theory seems to be backed up by the manufacturer who provides a two-year limited factory warranty on StarFighter.

We did have a slight problem with StarFighter failing to make contact in the left direction as a result of the rubber mounting being slightly off center. We suspect this may be because it was a prototype, and we assume the quality control will be improved in the actual production models.

The only difference, internal or external, between the two sticks is the control handle itself. The handle on StarFighter is 2⅛″ x ¾″ in diameter and is rounded at the top. It is made of a hard plastic material. While some players liked this design very much, others who were used to gripping a ball (such as that found on the Newport Prostick), complained that their hands slipped off the top. However, for those who like a ball, Suncom offers Slik Stick with a ⅞″ diameter ball on top of the 1⅞″ shaft.

The control cable on both joysticks is six feet long, compared to the four foot cable on the original Atari Joystick. This is a mixed blessing. While it allows players to sit further from the console, it also means there is more cord to wind up, and, in least in my case, something for the cat to play with as he attempts to distract me from a game of *Preppie*.

StarFighter costs $16.95 and comes with a two-year warranty. The price of Slik Stick is $9.95; it has a 90-day warranty.

Suncom offers another product in which left handers will rejoice. Most joysticks with the firing button in the upper left are, of course, oriented for right-handed players. While *Creative Computing* magazine published a simple way of opening the joystick and reconnecting the inside connectors for left-handed operation, this may not be a satisfactory solution in all cases—for example in a family where there are both right- and left-handed players.

Suncom has a different approach. It is a short cable with a male plug on one end and a female receptacle on the other which goes between the cable of any standard Atari joystick and the computer or VCS. After plugging it in, the joystick is simply rotated 90° to place the firing button in the upper right corner. A label (included) may be stuck on top of the joystick to identify it as a lefty top if desired.

## Zircon Video Command

Remember the Fairchild Channel F video game unit? Everyone liked the joysticks. Channel F didn't survive, but the joysticks did, and Zircon bought them.

The Video Command Joystick is a replacement for the Atari joystick. It is about 5″ long and 1½″ in diameter, designed to be held in one's hand. The moving joystick control at one end may be controlled by the thumb of the hand holding Video Command or by the other hand. The firing button is built-in; depressing the entire joystick mechanism closes the contact.

VIDEO COMMAND

We found this to be an outstanding replacement for the Atari joystick in most games—most games for the Atari that is. Its short, positive throw coupled with the built-in firing button makes playing games such as *Star Raiders* and *Onslaught* a positive joy. It is also excellent for most games on the Atari Video Computer System.

However, since movement is so easy with Video Command, it is not a good choice for playing games which require positive movement and a return to the center position between movements, i.e., Pac-Man and Berzerk and their derivatives. For these games we found the more positive spring mechanism in the standard Atari joystick highly desirable.

## Le Stick

Le Stick is a switch-type (Atari) joystick with a difference: there is no movable joystick! Le Stick is designed to be held in one's hand and simply moved forward and back, right and left to signal the program what you wish to do. It achieves this amazing action by having a set of mercury switches inside which detect when Le Stick has been tilted 20 degrees or more in one direction. The firing button is still of the conventional type and is found on the upper end of Le Stick. It is designed to be pressed with the thumb.

Le Stick has another internal switch which is activated by squeezing the handle. This "turns off" Le Stick and prevents any signal from going to the computer until it is released. We haven't found any use for this with commercial games, but it might be handy when writing your own.

We found that Le Stick takes some getting used to. Indeed, some players found it so "foreign" that they elected quickly to return to a conventional type of joystick after our test was over. Other players, on the other hand, loved Le Stick—especially the freedom to play with one hand.

Of all the joysticks tested, Le Stick was the most different. People had no middle-of-the-road opinions about Le Stick; they either hated it or loved it. We advise trying out Le Stick at a dealer or show; you may well find that is the joystick for you.

# APPLE PADDLE CONTROLS

## A2D Paddles (2002)

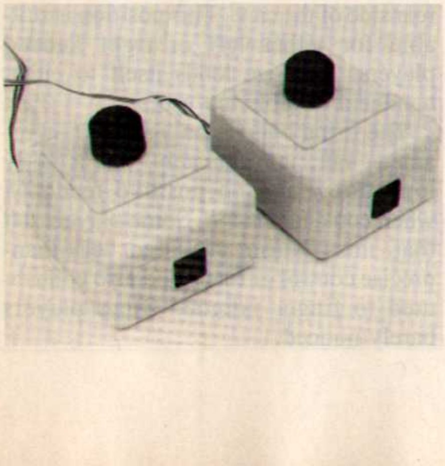
The A2D model 2002 paddle controls were physically the largest ones in this test. Children or women with small hands may find these controls too large for handheld use. On the other hand, most of our players judged them just fine.

Since the case is nearly square and the firing button is located in the center of one side (or end), it is equally easy to use with practically any finger of either hand. All of our players liked the large size (0.6″ square), short throw, and positive click of the A2D firing button.

The knob is just under 1″ in diameter, a size preferred by most players. Rotation is easy and provides precise adjustment to any point on the screen.

A diode isolation circuit prevented us from measuring the resistance of the potentiometers in the A2D paddles. However, as mentioned above, they provide precise control to any point on the screen.

The ribbon cables are a generous 8′ long. Unfortunately, there is no indication which is paddle 0 and which is 1 (out comes the trusty masking tape). Each paddle has an internal trim adjustment, however, no instructions are given for using this and we assume, that once adjusted at the factory, there should be no further need for user adjustment.



## Apple Paddles

Early Apple owners will remember the flimsy plastic paddles with miniscule firing buttons that came with the original Apple computers. Over the years, the design has changed several times; we tested one of the common types for comparative purposes. The paddles currently sold by Apple are described below.

The Apple Paddle is a small rectangular unit designed for handheld operation. The knob is just over 1¼″ in diameter which most of our panelists deemed to be the "right" size. Not so for the firing button. It is minute (3⁄16″ diameter) and leaves a nasty indentation in the finger pressing it.

The placement of the firing button on the left top of the case is less than optimal. In this position, it almost requires that the paddle be held with the left hand and the firing button operated with the thumb while the right hand attends to the knob. Left-handed players will find that they must hold the case in their palm, reaching around to the top with the index or middle finger of the right hand to operate the firing button while turning the knob with the left hand. This sounds a bit awkward, but at least it allows one to alternate between two fingers doing the firing when the indentation in one becomes unbearable.

All in all, the Apple Paddle makes it obvious why a replacement market has sprung up to produce more user-friendly devices.

Incidentally, it is possible to improve the old Apple Paddle controllers dramatically for about $3.00 and one-half hour of time. The improvement comes about by replacing the firing button and the control knob.

There are many momentary-contact SPST switches that will fit in place of the existing one in the Apple paddle. Find one that has a large surface for your finger (3⁄8″ diameter or more), short throw, and positive feel. I found some at the Trenton Computer Festival Flea Market for $0.50 each.

The other thing you will want is a new pair of knobs. Look for ones about 1″ in diameter that are held on with a setscrew rather than the knurled friction fit of the existing Apple paddle knobs.

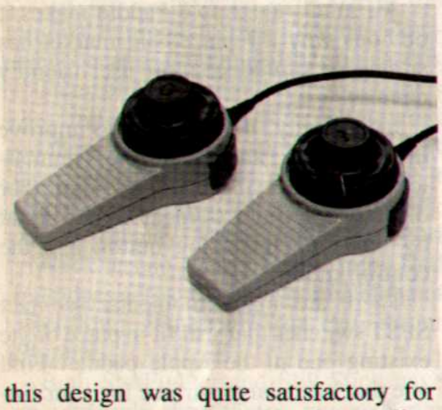
Pop open the case of the Apple paddle control (some have one screw, some don't), unsolder the old switch and remove it, and install your new switch. If your new switch requires a larger hole than the existing one, you'll have to enlarge the hole with a rattail file. Solder on the wires. Be sure to use the set of normally open (NO) contacts if you have an SPDT switch. Reassemble the case. Pry off the old knob and put on your new one. You'll be amazed at the difference!

## Hand Controller

These attractive, wedge-shaped controllers from the Keyboard Company (now owned by Apple Computer) are obviously designed for handheld use, though they may be used on the tabletop as well.

Departing from the design of other manufacturers, the firing button is located on the right side of the controller. It is a large rectangular controller which pushes down a microswitch, thus it provides both tactile and aural feedback. While extremely easy to press, some players felt that the large size of the button tempted them to hold their finger on it thus preventing the quick release required in games needing fast firing. In other words, these players felt they had to consciously both press and release the switch. On the other hand, some other players (right-handed) liked being able to control the firing button with their left index finger instead of a thumb.

The knob is a two-tiered design, the center of which is about 1″ in diameter and the outside just over 2″. We found this design was quite satisfactory for players who liked a small knob as well as those who liked a larger one. Detracting from the pleasing knob design, potentiometer rotation was rather stiff which some players felt hampered game play. On the other hand, I achieved my all time high score in *Tsunami* with this set of paddles.



A thoughtful touch is the molded "0" and "1" on the center of each paddle knob. Also thoughtful is the strain relief on the cable which goes in the notch of the Apple computer behind the game I/O port. In addition, a grounding clip is provided which is connected to the cable shield to minimize RF interference. These were the only paddles with an external cable ground.

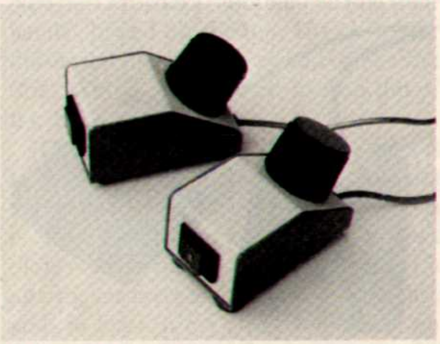
## Pro Paddles

These paddles were by far the most diminutive of those tested. They measure a scant 1½″ x 2½″ and have a 1″ diameter knob. A ⅜″ square firebutton is mounted on the back of the paddle. A thoughtful touch is the numbers 0 and 1 inscribed on each knob. This is a far tidier way of identifying paddles than the strips of masking tape I have on the backs of other paddes.

The small size of the Pro Paddes was praised by some members of our panel along with the placement of the firing button which makes it very easy to hold the paddle in one hand using first or middle finger to fire while the other hand controls the rotation. The fire buttons have a very short throw and a definite tactile feel when contact has been completed which some players found to be an advantage. Having the firing button squarely in the back also does not unduly favor right- or left-handed people. On the other hand, some people felt that the size of the Pro Paddles was just too small. However, this seemed to be a matter of preference because others liked the size very much.

In place of the flat cables found on many paddles and joysticks, Pro Paddles use a round, 3½′ cable for each paddle. While 6″ to 12″ shorter than most others, the round cables seem to be more flexible than flat ones and the difference in length was not noticed. Indeed, if a game extender is used, there is no reason for joystick and paddle cables to be over 2′ or 3′ long.

The potentiometers in the Pro Paddles seem to be stiffer than others, i.e., more difficult to turn and adjust. One player felt that this was an illusion as a result of the small size. As we did not measure this variable, stiffness remains a subjective observation.



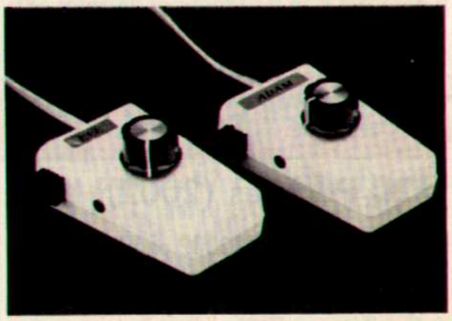
Apparently there are two different designs of the Pro Paddle; please see the photograph which shows the one that we tested.

In summary, the reaction to the Pro Paddle had more subjective factors than most others—small size, button placement, and stiff rotation. Some people liked the Pro Paddles very much while others were lukewarm. The best bet is to look at a pair in your local computer store or at a show before you buy.

## Adam and Eve

The Adam and Eve Paddles are an attractive, hand-fitting trapezoidal shape. The firing button is on the left rear side of the case, thus making it easy for both right and left handed players to control. Curiously, paddle 0 is labeled Eve and paddle 1 is labeled Adam.

The knob is just under 1″ in diameter which most players found convenient, particularly for fast movement from one end of the rotation to the other. Movement of the potentiometers was easy and precise.



The ⅜″ square firing button has a very short throw and a positive click when pressed, thus providing both tactile and aural feedback.

Each potentiometer has a trimmer control which allows the paddle to be matched precisely to your computer or particular games. These were the only paddles with an adjustment of this type. This trimmer is also said by the manufacturer to be able to compensate for excessive wear, a useful feature.

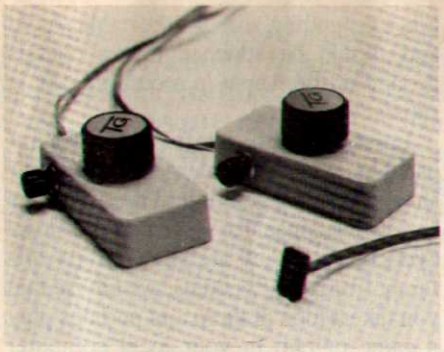
The five-foot cables to the paddles are more flexible than most and Tech Designs has thoughtfully provided a stress relief at the DIP connector end to prevent the cable from being pulled out of the back of the Apple.

In summary, we felt the Adam and Eve paddles were exemplary in all regards.

## TG Super Paddles

The TG paddles are rectangular in shape with the firing button on the left rear side of the case. This position is suitable for either left or right handed players. The size lends itself to either handheld or table top use.

The firing button is a large 0.6″ in diameter but, unfortunately, has a fairly long throw and no positive feedback when contact is made. Some players felt that this button provided less-than-precise control of firing and also contributed to finger fatigue. Other players barely noticed.



The knob was the largest of any paddles tested, 1¼″ in diameter. Since most games use only a portion of the potentiometer rotation, theoretically a large knob can be adjusted more precisely. Indeed, with our playing panel, the size led to sharply divided feelings: some players liked the large knob very much and others did not. On the other hand, all players agreed that the TG paddle could be adjusted very precisely and that the potentiometer was exceptionally easy to rotate.

Older TG paddles used a round cable, while new ones are coming through with ribbon cables and improved DIP connectors. There are no cable strain reliefs. Paddle 0 is designated by a red TG logo and paddle 1 by a black logo, a thoughtful touch (assuming you can remember which is which).

## Zircon Alpha Command

Under pressure from the FCC because of excessive RF radiation, Apple Computer stopped shipping paddles with their computers about 1½ years ago. Did you ever wonder what happend to all of those paddles in stock? Well, we can't be sure, but indications are that the latest models were bought up by Zircon and are now being offered as the Alpha Command paddles. If they are not the exact Apple paddles, they are an awfully good imitation.

Designed for handheld use, the Alpha Command paddles have a firing button on the right side of the unit. The paddle is shaped so that either left or right handed players will be able to hold it and press the fire button with either thumb, index finger or middle finger. The firing button has a relatively long throw and is concave in shape (outer lip higher than inner part of the button), hence it is somewhat uncomfortable for sustained firing. Also, some of our panelists were not pleased that the button did not provide either tactile or aural feedback.

On the other hand, the two-tiered knob was judged easy to move and met the needs of both those players who like a smaller knob (1″ in diameter) and those who like a larger knob (1¾″ in diameter).

ALPHA COMMAND
ALPHA COMMAND

Adjustment of the potentiometer was accurate and precise on all games tested.

The cables are round and flexible and just over 4′ long. They do not have a strain relief or shielding.

If you are looking for a bare bones, but adequate set of paddles, the price is right on the Alpha Command from Zircon.

## Kraft Paddles

The first thing that strikes one about the Kraft Paddles is that they are big. Measuring a bulky 4″ x 4″ x 2¼″, they were by far the largest of the eight sets of paddles that we evaluated. The knob is correspondingly large, measuring 2″ in diameter. The top of the case slants forward at about a 10 degree angle thus making the paddles most suitable for table top use. While people with large hands may find them suitable for handheld operation, most of our panelists preferred to use them on a table top or in their lap.

Upon picking up the Kraft Paddles for the first time, most of our panelists were surprised that the knob didn't rotate very far, 60 degrees to be exact. Indeed, the full resistance (0-150K ohms) is reached in just 54 degrees of rotation. This contrasts with a "normal" paddle (or potentiometer) which has over 300 degrees of rotation.

Apparently the designers of the Kraft Paddle felt that a short throw (or rotation) would give quicker response on the screen. They are right! Indeed, you can move missile bases, space ships, and other objects across the screen so fast that movement in some programs appears quite jerky. On the other hand, there is no denying that the paddles provide extremely quick response.

We were intially afraid that this type of design might sacrifice something in precision adjustment. In other words, if 150K ohms is spread over 300 degrees of rotation, virtually any point on the screen (in the X or Y direction) may be addressed by one paddle or the other. However, if this same 150K ohm resistance is confined to just 54 degrees of rotation, we were afraid that not every point could be addressed precisely. However, this

KRAFT
KRAFT

## APPLE PADDLE CONTROLS

| Manufacturer | Model/Name | Price | Size W x D x H | Table Top/ Hand Held | Potentiometer Resistance | Trim | Knob Size (in dia.) | Button Size (in dia.) | Button Placement | Tactile Feedback |
|---|---|---|---|---|---|---|---|---|---|---|
| A2D | 2002 | $34.95 | 3.0x3.5x2.0 | Both | n/a | No | 0.9 | 0.6 sq | Rear side | Yes |
| Apple Computer | Paddles (original) | 39.95 | 2.5x3.2x0.8 | Hand | 150K | No | 1.3 | 0.2 | Left top rear | No |
| The Keyboard Co. | Hand Controller | 29.95 | 2.0x4.5x1.0(1) | Both | 150K | No | 1.0/2.0 | 1.0x0.6 | Right side rear | Yes |
| Computer Works | Pro Paddles | 49.95 | 1.5x2.5x1.3 | Both | 150K | No | 1.0 | 0.4 sq | Rear side | Yes |
| Kraft | Paddles | 49.95 | 4.0x4.0x2.3 | Table | 150K | Yes | 1.2 | 0.4 sq | Left rear | Yes |
| Tech Designs | Adam and Eve | 39.95 | 2.0x3.5x1.0(1) | Both | 150K | Yes | 0.9 | 0.4 sq | Left side rear | Yes |
| TG Products | Super Paddles | 39.95 | 2.0x4.0x1.0 | Both | 135K | No | 1.4 | 0.6 | Left side rear | No |
| Zircon | Alpha Command | 19.95 | 2.0x4.3x1.0(1) | Hand | 150K | No | 1.0/1.7 | 0.4 | Right side | No |

(1) Shape is not rectangular

was not the case. Every point could be reached, although holding the paddle steady on a particular point (for instance to get the bonus targets in *County Fair)* was something else again! If you get the jitters after a cup of coffee, even a wee little bit, you won't be able to hold this paddle steady.

A feature which received mixed reviews from our panelists was the knurled knob design. People who grip the paddle quite intensely found themselves with miniature ridges on their fingers after a particularly grueling game of *Tsunami*.

The firing button is located on the upper left corner of the paddle housing. It is ⅜″ square and has a relatively long throw. Although it does not provide aural or tactile feedback, we found that it gave good control and was not fatiguing in long use.

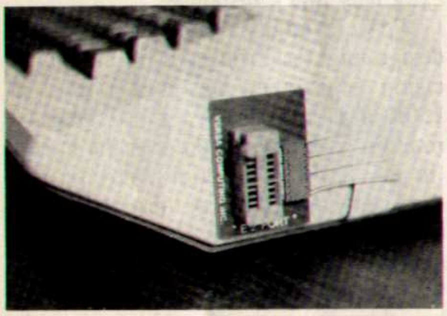
The cables are a generous 5′ long and are more flexible than most. A curious element is a short wire with an alligator clip at one end attached to the DIP connector that plugs into the game port. The instructions gave no clue as to what this is for. A phone call to Kraft revealed that it is a grounding wire for the cable shield and should be attached to the chassis ground of the Apple (a mounting bolt is satisfactory).

In summary, the Kraft Paddles are unusual because of their large size and their short 60 degree rotation. These features had strong appeal for some people. However, because they are significantly different from other paddles, we advise that you take a look at them and perhaps play a game or two in your local computer store to be sure that they will meet your personal needs.

# APPLE GAME PORT EXTENDERS

## EZ Port

*EZ Port* from Versa Computing is a simple, straightforward extension I/O port for the Apple. It comes with a long 24″ ribbon cable which probably makes for lots of RF interference but permits EZ Port to be mounted practically any place you desire: top, bottom, right, left, etc.



The device itself measures a diminutive 1½″ x 2″, just large enough for the cable connector and a zero insertion pressure DIP socket. Using this ZIP socket, you merely plug in the DIP connector from your joystick, paddle, etc. and throw a small switch which engages the connections within the socket. Mounted on the right side of the Apple, pin 1 is up and toward the front, a convenient position since the notched part of DIP plugs corresponds to pin 1. All in all, EZ Port is a simple, handy device.

## Happ Game Socket Extender

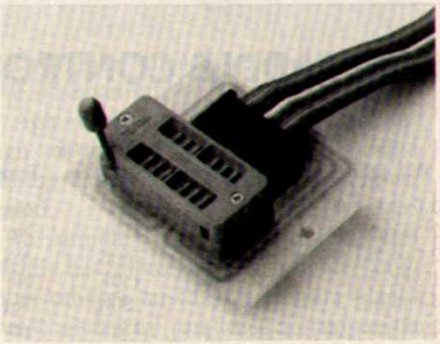
This simple, functional device consists of a small PC board on which is mounted a zero insertion pressure 16-pin DIP socket with a sticky back designed to be mounted on the right side of the Apple case.

It has a 24″ flat ribbon cable which can be snaked through the bottom or top of the Apple terminating in a DIP plug which goes into the game I/O port on the motherboard. To connect paddles or joysticks, the DIP connector is simply plugged into the ZIP socket and the small lever switch thrown to the up or down position depending on how the board has been mounted.

Although Happ recommends that the board be mounted with the switch in the down position, we found it far more convenient to mount it so it was facing up and toward the front of the Apple case. In this position, pins 1 and 16 are toward the top which conforms to our recommendation identifying the end of the DIP connector wth a small dab of liquid paper or white paint. Furthermore, in this position the cable leads to the back of the Apple case and can be neatly snaked out of the way.

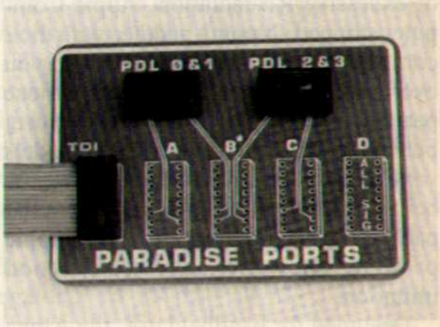
The device works well and is a bargain at the suggested $14.95 retail price.

A second version, Model GS-2, is the same as the GS-1 with the addition of an extra female socket on the male plug end (inside the Apple case). This is useful for certain decoder chips and other devices which must always be plugged in and work in parallel with paddles, joysticks, etc.



## Paradise Ports

On the 2½″ x 3½″ surface of this game extender device are mounted two switches and a jack to the 18″ cable that plugs into the Apple game port. In addition, four sockets are provided to plug in paddles, joysticks, etc. The design is unusual in that the sockets are actually a part of the printed circuit board itself. Sockets A, B and C are switchable, while socket D is permanently wired in parallel with the Apple game port. Socket A always goes into paddle port 0 and 1, while socket C always goes into paddle ports 2 and 3. Socket B may be switch selected for either one or both.

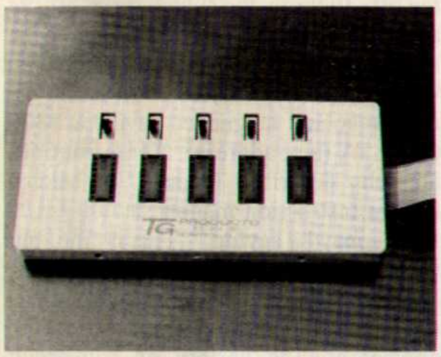


The entire back of the blue printed circuit board is covered by a rubber cushion pad. Together, the PC board and pad are only 5⁄16″ thick. While the instructions state that Paradise Ports is "mountable on Apple case," short of using Contact cement or drilling screw holes, we could not figure out an easy way to mount it on the case. Nevertheless, its compact size means it does not take up much space on a desk or table.

## TG Select-A-Port

Select-A-Port is an extender which allows up to five devices to be selected singly or simultaneously for input to the Apple. It is relatively compact, measuring 6″ x 3″ x ½″ and has five DIP sockets with a switch above each one. With four small rubber feet, it can be used flat on the surface of a table or a desk or even the top of the Apple. In addition, two small plastic mounting brackets are included which permit it to be suspended from the cooling fins on the left or right side of the computer.

Socket number 1 is a non-switchable socket which directly parallels the game I/O port. This is for sensitive devices with which diode isolation would interfere.



Sockets 2-5 are diode-isolated and switch selectable. Socket 2 modifies the device plugged into it to operate paddles two and three which is useful in applications requiring dual joysticks or four game paddles. Sockets 3 to 5 parallel the game I/O port and are useful for paddles, joystick, light pen, etc.

The instructions provided with Select-A-Port are scant but sufficient.

Select-A-Port is well designed and functional. We particularly like the individual switches on each port which allow external devices to be used one at a time or several simultaneously, something not possible with other extension port devices. The compact size is also a decided plus.

## Paddle Adapple

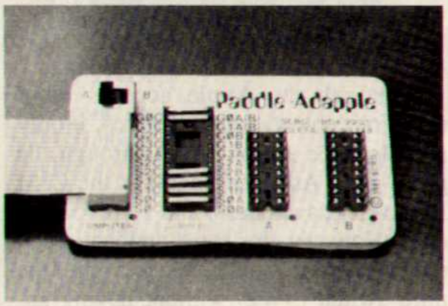
Paddle Adapple goes one step beyond a game port extender in that it may be used in two modes. First, it may be used as a simple switch between two game ports; second, it allows for up to four paddles or two joysticks to be input to the Apple.

Paddle Adapple consists of a 2″ x 3″ sticky backed PC board on which are mounted three DIP sockets (one input, two output), a small switch, and a jumper socket.

To use Paddle Adapple as a switch, one device is simply plugged into DIP socket A and the other into B. The small side switch is moved to either position A or B thus selecting that device. In this mode the six jumpers installed with the unit as it is shipped are left in place. However, it is possible to change two jumpers to reverse paddle 0 and paddle 1 in case you have worn out your paddle 0 from playing too many games.

The second mode of operation uses the jumper socket to provide a wide range of input combinations to the Apple. For example, two joysticks or four paddle controls may be input simultaneously to ports 0, 1, 2 and 3. Unfortunately, although the Apple accepts input from four devices, it only has three "fire button" inputs. However, a fourth input is possible using the cassette input jack at the rear of the computer. Paddle Adapple includes a plug and cable to go between the cassette input jack and the jumper socket on the unit. For those into it, this will allow four-player paddle/fire button games to be written.

The jumpers can also be used to exchange the X and Y axis on joysticks, use a light pen and paddles (or joystick) simultaneously, or use shift key modifications that plug into the game I/O socket.



The 14″ cable on the Paddle Adapple permits it to be mounted any place on the right side of the computer. Our one minor complaint is that the two output sockets are not zero insertion pressure sockets. Although theoretically one should not be changing devices around much with Paddle Adapple, we regularly use three, and occasionally four, devices which must be plugged in through the game I/O port. Thus, we prefer zero insertion pressure sockets.

Another minor complaint: when mounted on the right side of the Apple case, pin 1 is down to the rear, which is not the "natural" way one might expect to plug in a device. This is a very minor complaint, as the manufacturer obviously did not intend that the devices be plugged and unplugged from Paddle Adapple with any frequency.

Paddle Adapple comes with six extra jumper cables—enough for doing practically anything as well as replacing a cable or two. It also includes a cassette input cable and a comprehensive eight-page instruction manual.

## Expandaport

Measuring 6″ x 4″ x 2″, Expandaport was physically one of the largest extension port devices that we tested. Its six input DIP sockets were also more than found on any other device. They are clustered in three pairs on the top of the unit along with a small three-position toggle switch.

The instructions recommend that connector J-1 be used for game paddles and J-2 for a joystick. J-3 is wired for an additional joystick input (or two paddles) to ports 2 and 3. It is recommended that J-4 be used for a lightpen. These three inputs (J-1, J-2 and J-3 together and J-4) are selected with the three-position toggle switch.

Two additional sockets labeled J-5 are also available. It was not clear from the instructions how these were selected. Trial and error proved that they were both permanently wired in parallel with the input I/O and the position of the switch has no effect on them.

Expandaport also has a small speaker mounted in the left side of the unit and a cable which plugs into the Apple speaker connector on the right front of the motherboard. We have long been proponents of an external speaker for the Apple and found that it has ample power to drive a good quality 8 ohm extension unit. Indeed, the volume from an inexpensive $15 or $20 speaker is five to six times that from the internal Apple speaker. Thus, we had great expectations for the Expandaport extension speaker. Alas, the reality is that the sound is of lower volume and quality than that provided by the internal Apple speaker. The speaker in Expandaport is smaller than that in the Apple and has a sound reminiscent of the earphones that came with early transistor radios.

EXPANDAPORT

Expandaport comes with a generous 33" cable. Unfortunately, the instructions are not equally generous in their explanation of how to use the device. The best part of the instructions is the program which tests every function of every device that can be plugged into Expandaport. On the other hand, the instructions do not tell the user what to do about software protection devices, and lower case adaptors, which may require use of the game I/O. (They can be plugged into J-5).

In summary, for most applications, the paucity of instructions will pose no problem. Our advice: ignore the speaker and look at Expandaport as a versatile, convenient, expansion I/O port device.

## CJM Applexpander + S

The Applexpander is part of the CJM Microsystem, a comprehensive input, output and control system for the Apple. It differs from all the other expanders in that the Applexander uses Cinch Jones plugs and sockets, thereby requiring the purchaser to use only CJM components. A Jones plug to DIP socket converter is offered by CJM, but that seems to be defeating the purpose of the Microsystem.

As mentioned, this is more than just an extension port. We will first look at the input capabilities and then the output/control capabilities. Like other expansion devices, the 18" ribbon connector is designed to snake through the top of the Apple case after it has been plugged into the Apple game I/O port. The instructions refer to a diagram A for mounting the Applexpander on the case, but there was no such diagram in the manual. On the other hand, it was not difficult from the position of the sticky backed tape on the side of Applexpander to determine how it should be mounted on the right side of the Apple case.

Applexpander has two input sockets which can accept the usual two paddles, one joystick, light pen, or other input sensor as long as the device terminates in a Cinch Jones P-306 CCT plug. A full complement of such devices is available from CJM or the Jones plug may be installed on the cable of existing devices. Although a wiring diagram is provided in the back of the manual, we don't recommend doing this if it is your first construction project. If you have built at least one Heathkit, you'll have no trouble installing a Jones plug.

Input socket 1 is connected to paddle port 0 and 1, while input socket 2 goes into ports 2 and 3. These are not switched sockets; both are permanently connected. Five pages in the rather comprehensive manual are devoted to describing the operation of paddles and joysticks as graphics and game input devices. Five sample programs are included which demonstrate these concepts.

The "+ S" in the name of the device refers to "+ Speaker." Three twisted wires from the Applexpander are snaked through a cooling slot and are used to connect to the internal Apple speaker output and the speaker itself. Applexpander has a mini phone jack on the left front of the unit which provides for an external speaker to be plugged in. Additionally, Applexpander has a volume control which adjusts the volume of the internal or external speaker. If an external speaker is plugged in, the internal one is automatically turned off.

applexpander
CJM INDUSTRIES
2
in
1
out

Although the Apple accepts input from four potentiometer devices, it only accepts three switch inputs through the game port. Assuming one has the CJM Microstick, switches 0 and 1 are located on it. However, for some applications it may be desirable to be able to trigger the third switch (SW2) without having another joystick or set of paddles. Applexpander provides this capability in the form of a small pushbutton switch on the case of the unit.

Located adjacent to the pushbutton for switch 2 is a mini-jack. The function of this jack is to allow an external switch to be read into the SW2 input. The switch and jack are in series. The jack accepts only normally closed switches, but any number of these external NC switches can be wired in series and plugged into the mini-jack. If one of the switches is thrown, then the Apple will read SW2 as thrown.

This type of system can be used for security. For example, a series of switches around the house can be wired in series and if any one of them is thrown, the Apple would "know" it and could turn on an output module through the control box described below which, in turn, could turn on an alarm.

Another application might be a "failsafe," in which the Apple is used as a controller. Tripping a limit switch would halt the Apple and the system would shut down with the Apple signalling a warning.

In addition to the input ports on the game I/O, the Apple also has four annunciator outputs. These outputs are controlled by "soft switches," which is the term used to designate an output which is switched on from one memory location and switched off from another. For example, for annunciator 0, memory location -16295 is the on switch and -16296 is the off. To throw the switch on or off, its appropriate memory location should be loaded with 00. This is accomplished with POKE (address) 00 from Basic or, from machine language, an LDA $300 then STA (hex address). These routines are fully described in the CJM Microsystem instruction manual.

You may be saying, "This is fine, but what's it good for?" By itself, not much. But with an additional relay control module, these output switches can be used to control a wide variety of household devics such as a video tape recorder, lights, security devices, hi-fi system, or anything at all that can be turned on or off. In other words, with the addition of a relay box, the Apple soft switch becomes a real-world hardware switch.

In summary, the Applexpander + S is the heart of the comprehensive CJM Microsystem. The rugged Jones plugs will probably last far longer than the Apple itself. Used only as an extender, the unit is somewhat pricey. However, considering the additional output and control capabilities, the extension speaker, and the access to switch 2 open up many new possibilities and put the CJM Microsystem into a unique niche in the market.

## Sirius Joyport

### (Review by Randi J. Rost)

The Joyport is Sirius Software's first entry into the hardware field. It consists of a small plastic case about 6" x 4" x 1" that contains four I/O ports. The joyport serves as a game socket extension. In addition, it is an expansion to allow the use of two sets of Apple game paddles (with all four pushbuttons operational) as well as two Atari-type joysticks.

The Joyport user's manual is a 20-page document that contains several diagrams to aid in proper installation. The manual also contains instructions on using the Joyport and source listings of

*Continued on page 100.*

## Manufacturers of Joysticks, Paddles, Buttons, and Game Port Extenders

**A2D Company**
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(803) 297-0552

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Cincinnati, OH 45241

**Astar International Co.**
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Fairfield, CA 94533
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(703) 435-2991

**Computer Works.**
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Northridge, CA 91324
(213) 349-5560

**Cynex Manufacturing Corp.**
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Hillside, NJ 07205
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**Datamost**
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(213) 701-5161

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**Input/Output Computer Co.**
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Williamsville, NY 14221

**The Keyboard Company**
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Vista, CA 92083
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**Newport Machine Design**
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(617) 648-3230

*West Coast distributor:*
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**Sirius Software, Inc.**
10364 Rockingham Dr.
Sacramento, CA 95827
(916) 920-1195

**Southern Calif. Research Group**
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(805) 685-1931

**Spectravision**
39 W. 37th St.
New York, NY 10018
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**Starplex Electronics, Inc.**
E23301
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# PAC-M

### By Danny Goodman

It is known as a "hot property."

In the past, it may have been a character or theme from a movie, cartoon or even a comic strip. What makes it "hot" is that people not only pay to experience the original, but long for mementos of the experience, licensed mementos that can bring lots of income to the licensee in sales, and to the licensor in royalties. T-shirts, coffee mugs, bumper stickers, bed sheets . . . they all bear the likeness of the starring character.

But when the star is a video game creature, in addition to the key chains, novelty telephones, and stuffed dolls, you get versions of the game itself that you can bring into your own home.

And so it is with Pac-Man, the arcade game hit of 1981, a game that was still attracting truckloads of quarters well into 1982. A few home video and electronic game makers are hoping those arcade quarters can be converted into dollars—dollars spent on home adaptations of what may be the all-time favorite arcade game.

To check out how well the action, graphics, and sound of the original could be translated to home version, I examined two handheld/tabletop Pac-Man games, plus Atari's cartridges for their VCS, 400/800 home computers, and their new 5200 video game system.

## The Tabletop Challenge

Trying to reduce the complexity of detailed arcade screen graphics to a fixed, vacuum fluorescent display in a tabletop game is like trying to reproduce an automobile to a 1/32 scale model. In the model, the windows may not roll down, the dashboard has no working dials or idiot lights, and the motor won't be of the internal combustion or diesel variety. In other words, somethin's gotta give.

And in a tabletop game—where the intent is to draw a parallel to or imitate an arcade original—the major sacrifices are the nuances of the game that give the original its charm in the first place.

Of the two Pac-Man tabletop versions, Coleco's is far and away more arcade-like, compared to Tomy's Pac-Man. The Coleco game is one of the company's mini-arcade series replicas of popular video games.

The screen is partially shaded from surrounding light by a hood—intended to remind us of the semi-enclosed feeling we get when playing full-sized arcade games. Colorful stickers, depicting the cartoon artwork on arcade cabinets, adorn the hood sides and header. Other game characters grace the edges of the screen and the control panel area.

The controls on Pac-Man consist of a simple slide switch (Skill 1, OFF, and Skill 2), plus two, four-direction joysticks. The left stick is your Pac-Man direction controller and Game Select switch. Yes, there are four choices in game selection.

The first is a self-running demonstration, not particularly useful once you own the game, but surely an eye- and ear-catcher on the store counter. For actual game play, you can choose

PAC-MAN
HIGH SCORE
99030
MS. PAC-MAN
PAC-MAN
MB
PAC-MAN
TWO CHALLENGING PUZZLES
PAC-MAN
WIN AT
PAC-MAN
MS. PAC-MAN
WIN!
PAC-MAN
Inky
PAC-MAN
PINKY
BLINKY
CLYDE
PAC-MAN
Shrinky Dinks
COLLECTOR SET
1UP
170
1UP

# ANIA

from: 1) "standard" one player Pac-Man; 2) a rather interesting two-player ("Head-to-Head," in Coleco terminology) Pac-Man in which you and your opponent vie for the same dots and monsters—the scoreboard shows the points difference between the players and who is ahead; and 3) a novel variation called "Eat & Run" in which the screen shows only the four energizer dots, a monster guarding each, and your Pac-Man. You must snatch one of the energizers and take it back to the central pen when the door opens—of course while all four monsters are on your trail. In many ways, Eat & Run is more fun to play than Pac-Man, and having all three games in one cabinet is quite a deal.

PAC-MAN
MB
PAC-MAN
GAME
ARE YOU A PAC-MAN FIEND? FIND OUT WITH THIS I.D. CHART!
PAC-MAN
PLAY SET
PAC-MAN
PAC-MAN
PAC-MAN
PAC-MAN
PORTFOLIO

The screen is a fascinating study in packing many distinctly shaped elements into a minuscule plot of display real estate.

By itself, the display yields three colors: red, yellow, and a bluish-green, common to VF calculators. A fourth color, a distinct purplish, is achieved at specific display areas by a color filter bonded to the screen face.

To overcome the problem of portraying so many different characters—Pac-Man, monster, dot/energizer—at a given point, the display designers developed a composite screen character which, when fully illuminated, features the outline of a monster, a Pac-Man with mouth either open or closed, and a dot.

Each element of the composite appears to be addressable such that only a dot or only a Pac-Man can show. Or light up all elements, and you have a monster. Dots and Pac-Men are yellow, while monster outlines and the four energizers are red. Lines composing the maze walls are also red. When Pac-Man eats an energizer, the Pac-Man elements of all four monsters disappear—equivalent to "blue time" on the arcade original—and flash a few times just before the monsters regain their power.

The screen layout is a grid, nine of these composite characters high and eight wide. Above the grid are two rows of status indicators, including number of Pac-Man "lives" left in the game, and "GAME OVER" sign, arrows pointing left and right (to show who is ahead in Head-to-Head play), and the word "BEST" which shines at the end of the game with the score of the highest game of one-player Pac-Man played since the machine was turned on. The five score digits are located at the top of the screen.

I like many of the features of Coleco Pac-Man. For one, the maze layout is about as close to the original as affordable VF technology can get. It is not perfect, by any means, but for the 64 dots/4 energizers on the playfield, the wall layout lets you zoom around corners in smooth patterns as on the original.

Music is another plus. Not only do you get the Pac-Man opening theme when you select a game, but you also get a short rendition of the intermission theme from the original game each time you clear a screen of all dots. And, as on Midway's quarter-

PHOTOGRAPH BY TOM ZUK

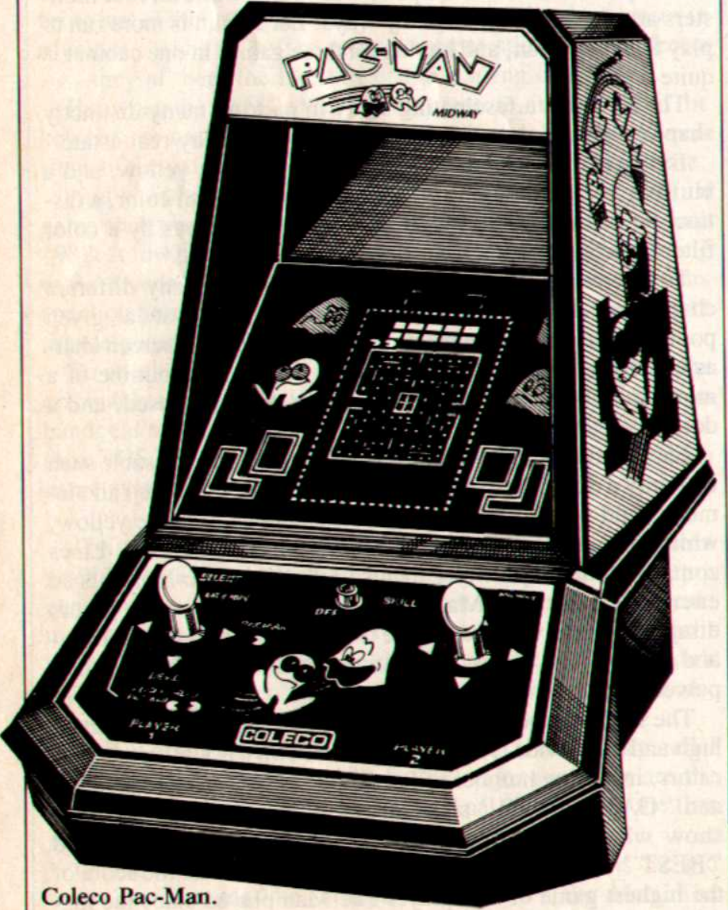
eater, you get an additional Pac-Man at 10,000 points. This is no easy feat, because, where you may be used to scores in the 6-8000+ range after the first arcade screen, Coleco's scoring system will probably hold you to 2-3000 points.

Yet all is not roses for the Coleco. One major disadvantage of the VF display is that all characters must "step" from location to location. The stutter-stepping movement is difficult to predict, especially when monsters are breathing down your neck. You can't tell which way they are going to move at a corner or intersection, so you unnecessarily lose quite a few Pac-Men.

There is no fruit to go after, either. In the arcade, the chance for a bonus score is a marvelously distracting element.

Next, the noise of the game, a kind of electronic whining, doesn't make the grade in reproducing the original sound. That would be all right, but it is so loud and constant that it drives you nuts after a while. Why don't all tabletop makers take a cue from Entex and offer a mute playing mode?

Finally, what may be a minor point—minor, that is, until you get good at the game—the highest (BEST) score you earn or Skill 1 will be erased from memory when you try to compare your prowess at the Skill 2 level, because the switch passes through the OFF position to get there. There must be a better way to do that.



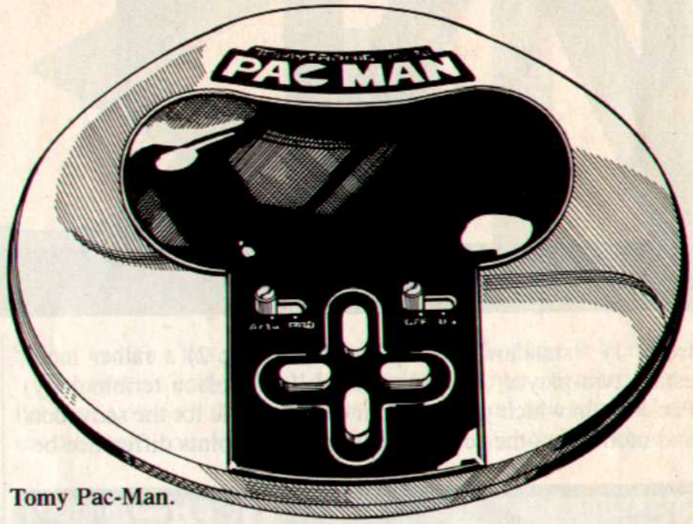
Coleco Pac-Man.

The price (under $75) may be a bit steep for some, especially since it is a "dedicated" (non-programmable) game. But my guess is that Coleco's Pac-Man will find its way into many home arcades.

### Tomy Pac-Man

A much less true-to-arcade version comes in Tomy's yellow disc-shaped Pac-Man. The cleverness of the game's design, however, stops at the basic shape and color.

The vacuum fluorescent display of the unit is simple in concept, with distinct figures for Pac-Man, monsters and dots, in a horizontally oriented, five-by-eight grid. With each character depicted separately, Pac-Man and a monster never occupy the exact same spot—they can only stand side-by-side in the same grid block. You never know, then, when you are about to be caught by a nearby monster. Nor do you experience that satisfying arcade feeling of having your Pac-Man literally gobble up a monster when he is energized.



Tomy Pac-Man.

Only eighteen dots and two energizers are scattered about the extremely simple maze. Control of Pac-Man is by four directional pushbuttons—an arrangement which has always been awkward for me, whether on a handheld game, or on a microcomputer game without joysticks. The most bizarre aspect of this limited reproduction game is that Pac-Man can eat dots only when he is travelling from right to left. I suspect this was thrown in to compensate for the sparse maze.

One redeeming feature of the Tomy game is that the fruit symbol (cherries) appears in a special box twice during each screen. If the game had a more complex maze, this element would add a great deal of excitement, because the opportunity for a bonus makes you take greater risks and breaks up your pattern. But in this maze, you are practically guaranteed of picking the cherries off every time. And, again, Pac-Man doesn't "eat" the cherries. All he does is stand next to the fruit to score 100 points.

One other nice Tomy feature that would have been a blessing on the Coleco is that after the game, the scoreboard toggles between your final score and the screen level you were on. Good players might otherwise forget after a few boards.

For its lack of imitation of the original, however, Tomy's unit has a place in the market with a price of under $35. The sound package may not be as annoying to adults as the Coleco, and the unit may satisfy the youngster demanding some kind of home Pac-Man action.

### Video Renditions

Atari raised the expectations of VCS owners when they announced the coming of the only officially licensed Pac-Man video game cartridge. In fact, as one method to keep potential VCS buyers from straying to Brands X, Y or Z at Christmas last year, Atari ran newspaper ads foretelling of the impending arrival of Pac-Man in VCS cartridge form.

In their early 1982 cartridge catalog, Atari stated clearly in it description of the cartridge that Atari's Pac-Man "differs slightly from the original." That, perhaps, was an understatement.

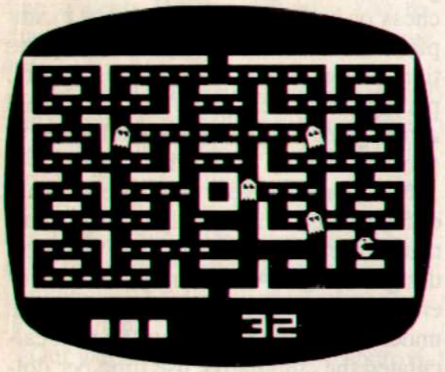
The maze layout is horizontally oriented—a necessity for home TV sets—and has escape hatches at the top and bottom of the screen. It takes only a couple seconds of working Pac-Man through the maze to realize that the maze itself is no piece of cake. There are few long straightaways, and it is not easy to find patterns that allow smooth flow for Pac-Man without having to double back over covered territory to get one last dot in a quadrant.

Other graphic elements roam far from the original. Dots are played by dashes, bonus fruit is played by a yellow and orange box called a vitamin, and the four energizer dots are portrayed by dashes called power pills.

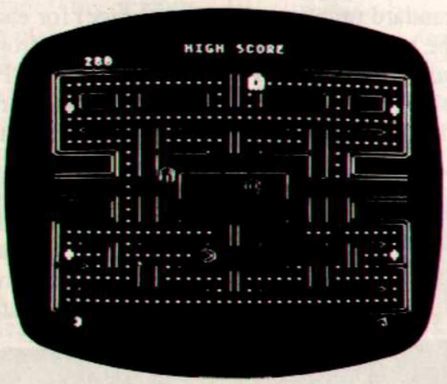
Pac-Man has a different way of opening his mouth in Atari's version—sort of a vertical chew, rather than the customary hinged gobble. Monsters, called ghosts, don't have moving eyes to indicate their direction, and they are all the same color. They do, however, turn a bluish color when Pac-man is energized (power pilled?). The game starts with four Pac-Man lives, and you earn an extra Pac-Man each time you clear the board of dots.

As with most Atari VCS cartridges, this one, too, offers several game variations—eight to be exact. Each variation controls the speed of Pac-Man or ghosts. Game number six is the fastest speed, and probably the one skilled players should go to immediately.

One word of warning: you must anticipate turns early. Pac-Man is a bit slow to react to the joystick—but he is on the arcade version, too.



**Atari VCS Pac-Man.**



**Atari 5200 and 400/800 Pac-Man.**

Interest in the Pac-Man cartridge exploded when it first became available in March, 1982. But by early summer, there seemed to be either plenty of cartridges around in the stores, or a diminished interest in the VCS version. I suspect the latter, as word-of-mouth spread that the game was nothing at all like the arcade game.

Much criticism has been hurled at the Atari game designers about Pac-Man. In a way this criticism is unfair. Granted, as a replica of the original arcade board, the VCS cartridge fails miserably. But as a challenging video maze game on its own merit, it would rank high on the list of great cartridges if the arcade game had never existed.

Atari's Pac-Man is not a bad cartridge—just a sad replica of an arcade game. Limited graphics ability of the VCS is partly responsible, but the real problem is that the cartridge is call Pac-Man with an asterisk: referring to the Midway trademark. Atari seemed to gobble up the video game rights to a very popular game—leading VCS followers to assume Atari would try to imitate the original elements—and therefore keep would-be competitors out of the dot/maze game cartridge arena (Odyssey$^2$ and Astrocade had dot/maze games on the market and in the wings, respectively). Thus the great Pac-Man VCS expectations were shattered.

## Computer Pac

Even if the VCS cartridge pulled the rug out from arcade aficionados, Atari's home computer and 5200 advanced video game system cartridges will make them drool. Whereas the VCS game play scarcely resembles its founding father, the more expensive home versions have practically everything covered, and covered well. About the only visible difference between arcade and these home Pac-Man games is the orientation of the video screen. The home TV is irrevocably a horizontally proportioned device, while most arcade screens are vertically oriented.

But everything is faithfully reproduced: the different colors and behaviors of the monsters, skill level symbols at the lower right of the screen (also appearing twice each board for bonus points), scoreboard "1 UP," "2 UP," and "HIGHEST SCORE" at the top. Scoring is identical to the original, including an extra Pac-Man (as shown on the lower left of the screen) at 10,000 points. For trivia fans, these advanced Atari version screens have 256 dots vs. 240 on the arcade.

Sound cues are a bit different. I guess the sound chip inside the computer and the 5200, its close relative, can't recreate my favorite "wocka-wocka-wocka" sound.

Instructions are simple, and they include something most Pac-Man fanatics had to learn from a Pac-Man beater's paperback guidebook: a chart of Pac-Man, Blinky and other monsters' relative speeds at each board level, plus the length of monster blue time and number of transitional flashes before turning aggressive at each level.

As much as I liked the computer cartridge, the 5200 system cartridge won me over with the finishing touch: two intermissions, complete with arcade game music and humorous scenes. I haven't seen the second intermission yet, but I presume it is like the arcade game, and we are spared the third intermission which shows what a disrobed monster looks like.

Both versions offer a feature Pac-Man freaks would certainly like to see on the arcade machine. At the press of a button, you can select the starting point of the game from eight different levels, ranging from Cherries (1st maze) to Keys (13th maze). That way, you can practice higher levels without wading through the slow, easy levels.

What is so amazing about the computer and 5200 versions is that the displays have remarkable graphic detail in a far coarser resolution medium (home color TV) than the arcade screen: Yep, Atari did pull off a superb rendition—actually, two of them—of our lovable Pac-Man and his ordeal. These cartridges certainly earn the right to the asterisked Pac-Man title.

Short of trying to buy up a well-used, reconditioned Pac-Man arcade game for perhaps $1500, you can still get at least two darn good home versions for under $400 and be able to play a bunch of other arcade games besides.

Save up those quarters! ■

# BATTERIES FOR ELECTRONIC GAMES

By David H. Ahl

"In six months, I spend more on batteries than the game cost in the first place."

"No matter how much I yell and scream, he always forgets to turn it off, and, poof, another set of batteries shot."

"Alkaline, long life, general purpose—they're all the same—they all wear out too soon."

Sound familiar? It's difficult to get along without batteries in this portable electronic age. As a result batteries have become a big business with big ad budgets, lots of hype and not many solid facts.

One maker claims their alkaline battery lasts up to ten times as long as an ordinary battery. Another maker touts the long shelf life of their batteries. Everyone "knows" that akaline batteries are better and sales figures reflect this bias.

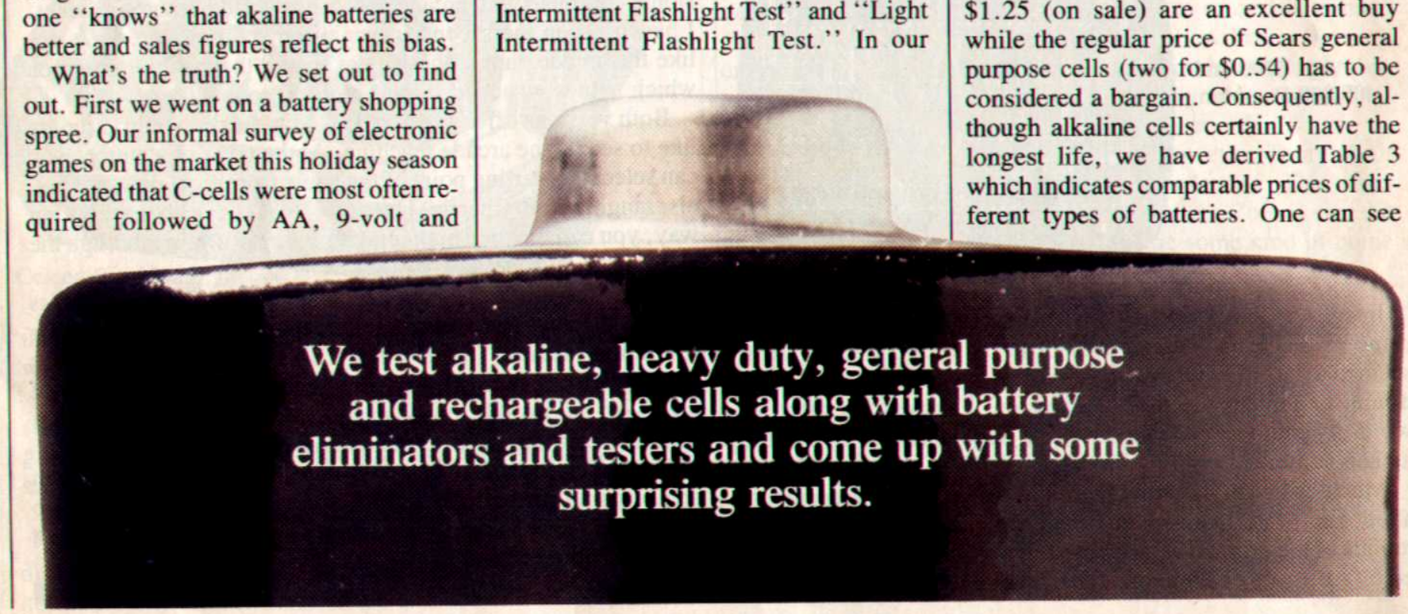
What's the truth? We set out to find out. First we went on a battery shopping spree. Our informal survey of electronic games on the market this holiday season indicated that C-cells were most often required followed by AA, 9-volt and D-cells in that order. Hence, we decided to test C-cells and assume that differences between brands, if any, would hold true for AA, 9-volt and D-cells as well. Furthermore, alkaline cells are the most popular among consumers so we bought seven different brands of alkaline C-cells along with four "long life" and four standard batteries. We also bought a battery charger and accompanying Ni-Cad cells. In addition, we bought three battery eliminators—two with specific voltages and one "universal" type. And, just to be complete, we bought an inexpensive battery tester.

### Test Procedure

The American National Standards Institute (ANSI) has a standard rating system for batteries and the battery industry also has two "standard" tests: "Heavy Intermittent Flashlight Test" and "Light Intermittent Flashlight Test." In our opinion, none of these comes close to approximating the usage one might expect in a typical electronic game. Even in games, the usage will vary widely. In a chess or backgammon game, for example, the batteries are likely to be in operation for relatively long periods (hours, perhaps, in a chess game). In a handheld action game, usage is more likely to be in short 15-minute or half hour bursts.

Most games give a low battery signal or fail to function correctly when the voltage decreases to about 70-75% of the design voltage. Accordingly, we considered a battery to be dead when its voltage under load dropped to 1.1v. We then calculated the cumulative use time per dollar (average) for each of the four types.

It is apparent from Table 1 that prices vary widely. Two Panasonic C-cells for $1.25 (on sale) are an excellent buy while the regular price of Sears general purpose cells (two for $0.54) has to be considered a bargain. Consequently, although alkaline cells certainly have the longest life, we have derived Table 3 which indicates comparable prices of different types of batteries. One can see



We test alkaline, heavy duty, general purpose and rechargeable cells along with battery eliminators and testers and come up with some surprising results.

PHOTOGRAPH BY TOM ZUK

from this table that a pair of $2.49 alkaline C-cells is equivalent to $1.34 for heavy duty cells or $1.10 for general purpose ones. Hence, two Sears general purpose cells for $0.54 are equivalent to $1.25 for a pair of alkaline cells.

### What About Rechargeables?

A word about rechargeables: assuming 1000 recharges as advertised by the manufacturers, they are clearly a much better buy than any conventional cells, even including the cost of the charger. We did not check the validity of the claims of 1000 recharges, as that would have taken nearly three years. However, our experience with rechargeable electric razors indicates that there is noticeable deterioration in performance after about 18 months (about 500 charges). This suggests that the theoretical maximum number of recharges may indeed be 1000, but that 500 may be a more realistic working boundary.

The cost of a charger is about $8-12 while two cells cost $6-9. This means the cost per use plus electricity for operating the charger based on 500 charges is less than 6 cents. Even with only 100 recharges, the cost is under 30 cents per use.

The life of a battery is quite different if it is in continuous use versus intermittent use because the latter gives it an opportunity to recover between uses. Alkaline batteries tend to have less voltage drop in use than others. Standard carbon/zinc cells have large voltage drops after an hour of use, but also rebound substantially overnight.

Our use test was designed to approximate use of the "average" toy or game. We measured the current drain of six representative games. The range was from 35 ma (milliamperes) to 220 ma with generally an additional 20-30 ma when the device played some sort of tune at the beginning or end of a game. Hence, we used a precision 15-ohm resistor as a load which, across 1.5v, provides a current drain of 100 ma.

While every user is different, we tried to approximate a typical use cycle. Day one, say Christmas, we had one hour continuous use. Day two, one-half hour. Day three (friends came over), two one-half hour uses with 1½ hour recovery between each. Day five through battery rundown, alternate between one and two one-half hour uses per day. The discharge curves for the four battery types are shown in Figure 1. This shows the average voltage in each half hour period of use. Figure 2 is a "close up" of a portion of the curves in Figure 1 which shows the

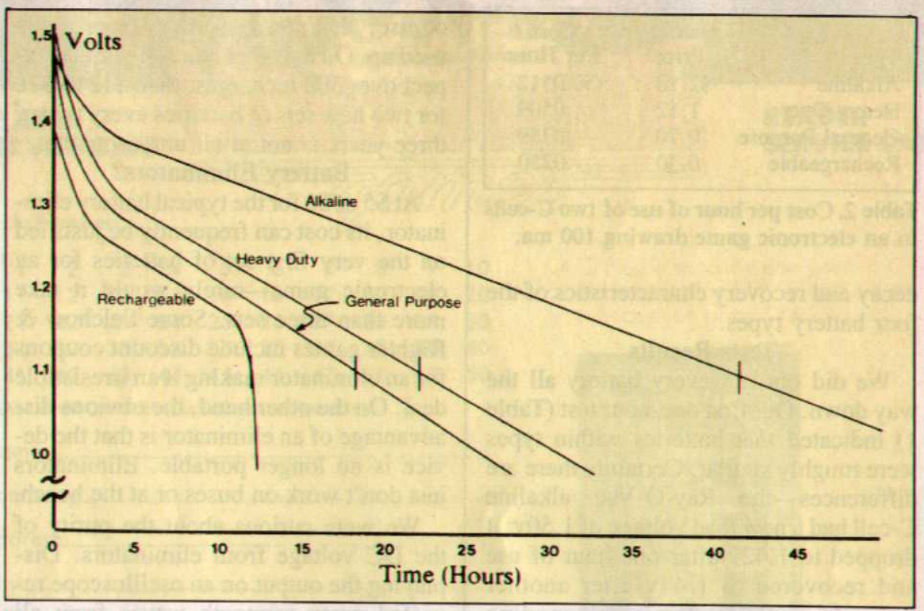


Figure 1. Discharge curves.

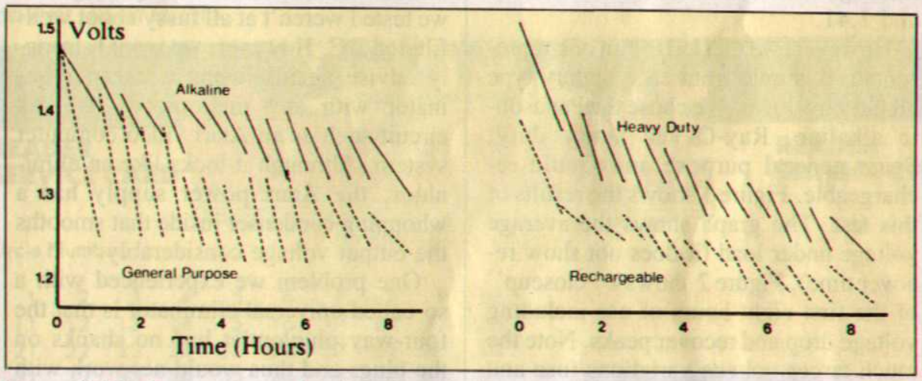


Figure 2. Discharge curves showing drop during use and recovery.

| *Brand* | *Designation* | *Retail Price for Two Cells* | *New-No Load* | *New-100 ma Load* | *After 1 hour Load* | *% of Orig.* | *After 1 hour Recovery* | *% of Orig.* |
|---|---|---|---|---|---|---|---|---|
| **C-Cell Alkaline** | | | | | | | | |
| K-Mart | Super Cell | $1.88 | 1.55 v. | 1.50 v. | 1.42 v. | 95% | 1.45 v. | 97% |
| Ray-O-Vac | 814-2 | 1.99 | 1.55 | 1.50 | 1.42 | 95 | 1.45 | 97 |
| Sears | Die Hard 4683 | 2.39 | 1.55 | 1.50 | 1.42 | 95 | 1.44 | 96 |
| Radio Shack | Alkaline 23-551 | 2.19 | 1.58 | 1.52 | 1.42 | 93 | 1.46 | 96 |
| Panasonic | AM2 | 1.25 (1) | 1.51 | 1.48 | 1.40 | 95 | 1.43 | 97 |
| Eveready | Energizer E93 | 2.49 | 1.53 | 1.50 | 1.40 | 93 | 1.42 | 95 |
| Duracell | MN1400 | 2.49 | 1.52 | 1.48 | 1.38 | 93 | 1.41 | 95 |
| **C-Cell Heavy Duty** | | | | | | | | |
| Radio Shack | Extra Life | 1.10 | 1.60 | 1.57 | 1.43 | 91 | 1.49 | 95 |
| Mallory | M14HD | .99 | 1.61 | 1.52 | 1.39 | 91 | 1.43 | 94 |
| Ray-O-Vac | Heavy Duty 4C | .89 | 1.59 | 1.51 | 1.38 | 91 | 1.42 | 94 |
| Eveready | 1235 | 1.49 | 1.60 | 1.52 | 1.37 | 90 | 1.41 | 93 |
| **C-Cell General Purpose** | | | | | | | | |
| Eveready | 935 | .79 | 1.58 | 1.49 | 1.28 | 86 | 1.37 | 92 |
| Sears | 4671 (BEST BUY) | .54 | 1.59 | 1.49 | 1.25 | 84 | 1.38 | 93 |
| Radio Shack | 23-467 | .68 | 1.55 | 1.46 | 1.28 | 87 | 1.34 | 92 |
| Treasury | Long Life | .77 | 1.57 | 1.45 | 1.22 | 84 | 1.34 | 92 |
| **C-Cell Rechargeable** | | | | | | | | |
| Gould | Again & Again (BEST BUY) | (2) | 1.40 | 1.39 | 1.28 | 92 | 1.28 | 92 |

(1) Sale Price (2) Cost for battery charger and four C-cells, $19.95.

Table 1. Battery voltage measurements before and after one hour of use. Batteries are listed in order of overall use and recovery characteristics, although differences within groups are slight. See article text for discussion and buying recommendations.

| Type | Average Price | Cost Per Hour |
|---|---|---|
| Alkaline | $2.10 | $0.0512 |
| Heavy Duty | 1.12 | .0509 |
| General Purpose | 0.70 | .0389 |
| Rechargeable | 0.30 | .0250 |

**Table 2. Cost per hour of use of two C-cells in an electronic game drawing 100 ma.**

decay and recovery characteristics of the four battery types.

### Tests Results

We did not run every battery all the way down. Our first one-hour test (Table 1) indicated that batteries within types were roughly similar. Certainly there are differences—the Ray-O-Vac alkaline C-cell had a new load voltage of 1.50v; it dropped to 1.42v after one hour of use and recovered to 1.44v after another hour. In contrast, the corresponding readings for a Duracell were 1.48, 1.38 and 1.41.

However, we elected to run one representative sample from each battery type all the way down. We chose the Panasonic alkaline, Ray-O-Vac heavy duty, Sears general purpose and Gould rechargeable. Figure 1 shows the results of this test. The graph shows the average voltage under load (it does not show recover time). Figure 2 shows a "closeup" of the first eight hours of use including voltage drop and recover peaks. Note the much larger voltage variations (use and recovery) in a general purpose battery versus an alkaline cell.

Counterbalancing this cost advantage is the much shorter use cycle. What this means in reality is that one must *remember* to put the batteries back on charge and that it is probably worthwhile to have two sets of batteries to exchange with each other.

Another problem is that for best life, the batteries should not be run down all the way before recharging, nor should they be recharged too soon. Each time into the charger for the required 14-16 hours counts as a recharge cycle. So if one recharges after only 15 or 30 minutes of use, that's still one recharge cycle used up. On the other hand, if one can expect over 500 recharges, then $12 to $18 for two new sets of batteries every two or three years is not at all unreasonable.

| Alkaline | Heavy Duty | General Purpose |
|---|---|---|
| $2.75 | $1.47 | $1.21 |
| 2.50 | 1.34 | 1.10 |
| 2.25 | 1.21 | .99 |
| 2.00 | 1.07 | .88 |
| 1.75 | .94 | .77 |
| 1.50 | .80 | .66 |
| 1.25 | .67 | .55 |
| 1.00 | .54 | .44 |

**Table 3. Equivalent prices of three types of batteries.**

### Battery Eliminators?

At $5 or $6 for the typical battery eliminator, its cost can frequently be justified on the very first set of batteries for an electronic game—rarely would it take more than three sets. Some Selchow & Righter games include discount coupons for an eliminator making it an irresistible deal. On the other hand, the obvious disadvantage of an eliminator is that the device is no longer portable. Eliminators just don't work on buses or at the beach.

We were curious about the purity of the DC voltage from eliminators. Displaying the output on an oscilloscope revealed nasty sawtooth waves from all three eliminators. Fortunately the games we tested weren't at all fussy about well-filtered DC. However, we would strongly advise against using a cheap eliminator with any microprocessor-based circuit such as an Atari video computer system. Although it looks like an eliminator, the Atari power supply has a whopping condenser inside that smooths the output voltage considerably.

One problem we experienced with a so-called universal eliminator is that the four-way plug/outlet had no shanks on the plugs and thus would not work with games that had recessed jacks. More annoying was the fact that about half of the games we tested had no provision for an eliminator.

### Battery Testers

Most inexpensive battery testers ($4-$10) are nothing more than voltmeters with, generally, five to seven different ranges to accommodate batteries of different voltage. The scale is typically marked with just two zones: replace (red) and good (green). On the 1.5v range on the Radio Shack tester we bought, the division between the two ranges fell at 1.1v.

Since we found that most devices started to malfunction when voltage fell to 1.1, a tester is an accurate indicator of whether or not a battery will work, right?

Well, maybe. The Radio Shack tester, like most others, has three built-in loads for each voltage range. For 1.5v cells, the loads were 10 ma (150 ohms), 50 ma (30 ohms) and 150ma (10 ohms). The instructions recommend using the heavy load with D-cells, medium load with C-cells and light load with AA batteries. However, our measurements showed that some electronic games using AA batteries draw up to 200 ma. Thus a battery might read "good" on the low range (10 ma load) but would not operate in a game with a 200 ma current drain.

In general, we recommend using the medium and high load of a tester for all batteries. There are few devices, even including calculators, that draw as little as 10 ma. Even so, a tester will give only a general indication of condition.

The real test is whether or not the battery will power a particular game, radio or flashlight. And the only way to determine that is to try it in the device.

### Conclusions

In tests approximating the use of batteries in electronic games alkaline batteries lasted for 41 hours, heavy duty batteries for 22 hours and standard carbon/zinc cells for 18 hours. Our tests in no way substantiated manufacturer claims for heavy duty batteries (more than twice the life) or alkaline batteries (up to seven times the life) compared to general purpose cells.

Assuming the prices we paid were representative, the cost to operate an electronic game requiring two C-cells would be about five cents per hour using either alkaline or heavy duty cells, just under four cents per hour using standard cells and two and one-half cents with rechargeable batteries.

One of the "laws" of electronic game use is that the game will be left on overnight at least once a month. No matter what kind of cells are being used this will run them down. Hence, because of this as well as the comparative cost we recommend rechargeable batteries as the best buy. Our second choice would be to use a battery eliminator when the game is used at home and general purpose cells for other use. We recommend shopping for the cheapest general purpose cells and buying four or five sets. Manufacturer claims to the contrary, we can find little reason to pay premium prices for either heavy duty or alkaline batteries.

For use in cassette recorders or devices sure to be shut off after every use, alkaline batteries may represent a convenient (fewer battery changes) and economical alternative. But use Table 3 as a price guide. If a pair of standard cells costs $0.79, a pair of alkaline cells would have to cost $1.75 or less to be a better buy. Table 3, incidentally, is applicable to any kind of battery: D, C, AA or 9-volt.

Finally, a word of warning. We purchased one set of Treasury "Long Life" batteries which seemed to be heavy duty cells. It turned out they were simply general purpose cells. *Caveat emptor.* ■

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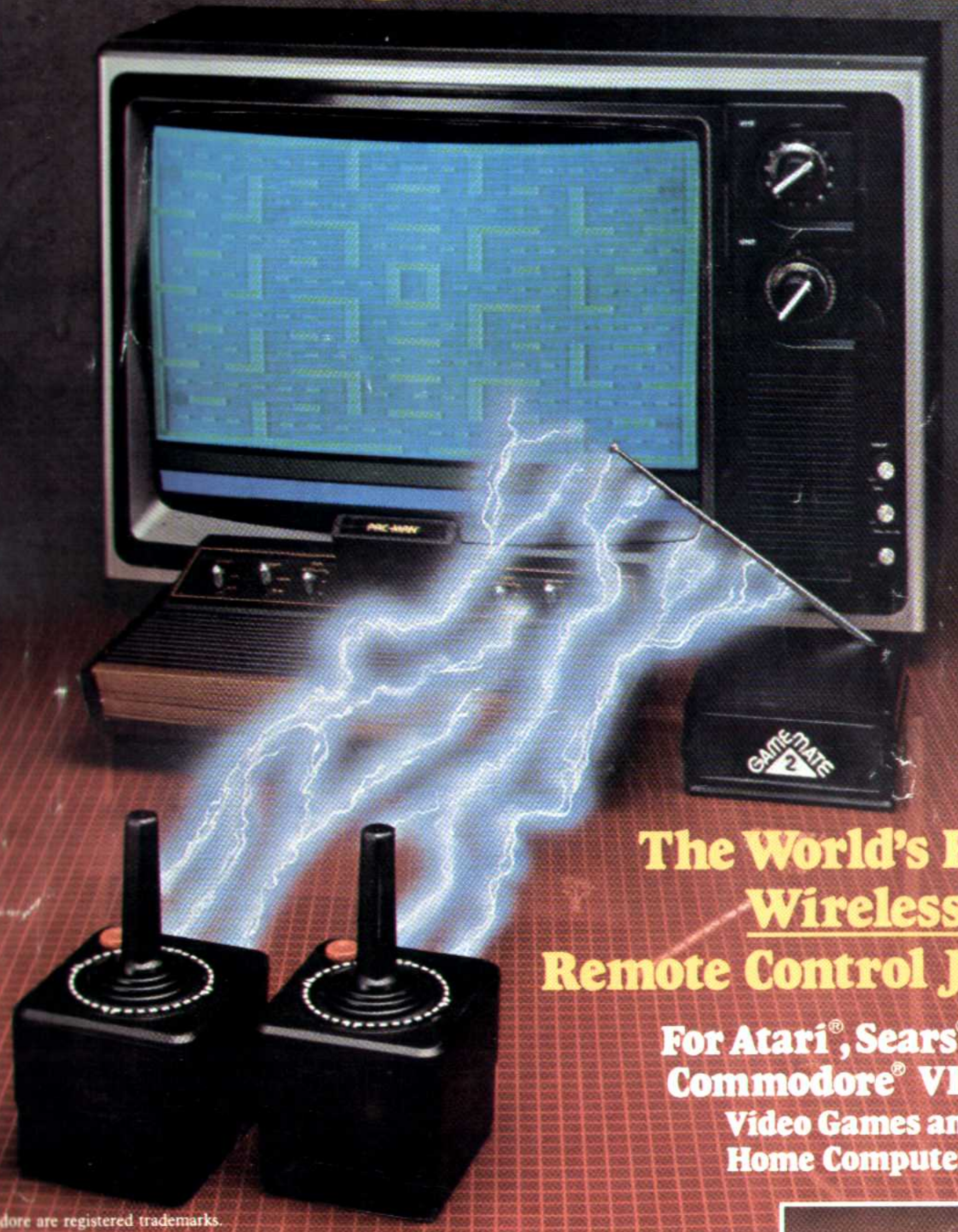

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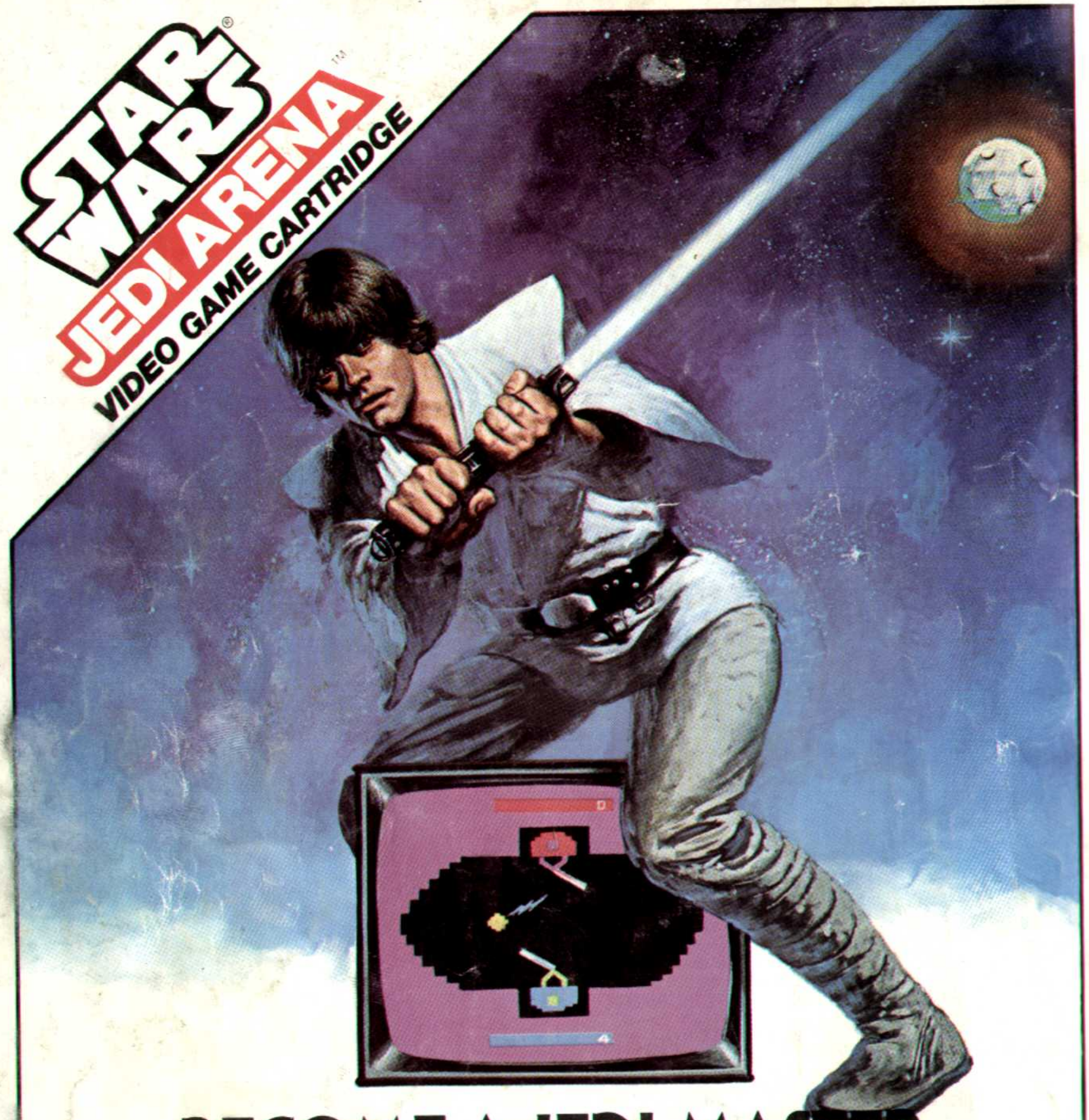
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